"MULTUM IN PARVO."

HANDY NOTES AND QUERIES.

A MANUAL OF USEFUL INFORMATION,

OF ESPECIAL IMPORTANCE TO DEALERS IN

HARDWARE, STOVES AND TINWARE,

MACHINISTS',

GAS-FITTERS' AND PLUMBERS' MATERIALS

AS WELL AS THE VARIOUS WORKERS IN USEFUL METALS,

INCLUDING ALSO

A NUMBER OF ADDITIONAL PAGES, GIVING INFORMATION OF A MORE GENERAL CHARACTER.

Compiled from various sources by

Henry Hopkins

NEW YORK:
HENRY HOPKINS & CO.,
85 Chambers St.
1887.

RAILS. STEELS. WIRE.

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STEEL RAILS,

HEAVY RAILS,

LIGHT RAILS,

RAIL FASTENINGS,

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STEEL SPECIALTIES

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Merchant Bar and Cold Rolled Steel, Plow Steel and Plow Shapes, Eliptical Springs, Finger Bars, Rake Teeth, Harrow Teeth.

ALL KINDS OF WIRE.

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INDEX TO ADVERTISERS.

TO HARDWARE MANUFACTURERS.

THE "NEAR-BY" EDITION FOR 1888-9 of

HOPKINS' HANDY NOTES AND QUERIES.

The next Edition of this Popular Advertising Medium will be the "Near-By" for 1888-9, which will be published about April 1, 1888, and consist for the first time of

10,000 COPIES,

which upon publication will be distributed gratuitously among 6000 Dealers classed as "HARDWARE" and 4000 Dealers classed as "STOVES, TIN" and "HOUSE-FURNISHING," in the following "NEAR-BY" States: **Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania and Maryland.**

TERMS FOR ADVERTISING:

TWENTY DOLLARS A PAGE.

(Half Pages, Half Price.)

PAYABLE UPON PUBLICATION.

The Publishers of this original medium for reaching the Hardware Trade are practical salesmen with a continuous New York experience of 30 years connection with the business, which warrants the assurance that the manufacturers whose patronage is bestowed upon "HANDY NOTES AND QUERIES" may ultimately receive, even through the efforts of the publishers alone, a sufficient remuneration to more than compensate them for the nominal outlay incurred in the advertising solicited.

"Trade Journals," reaching only a limited number of actual subscribers, are not alone desirable mediums for advertising. In our publication we promise that a copy will reach the hands of every dealer in "Hardware" in the States mentioned who possesses a commercial rating; and the thoroughness of such a canvass in a publication like ours, which is never thrown away, can readily be understood by intelligent advertisers.

Every second year only we publish an Edition to be sent gratuitously through the same States; so that for the ensuing two years advertisers may feel assured their announcements will be within reach, on the desks of

TEN THOUSAND DEALERS

whose patronage they are desirous of obtaining.

In estimating the value of this high-class circulation, remember it goes only to business men or firms, and differing entirely from a newspaper, is always retained and suspended for ready reference beside the desk of the recipient.

Yours truly,

HENRY HOPKINS & CO.,
85 Chambers St., New York.

INDEX TO ADVERTISERS—Continued.

NEW PAGES

(Not in Any Previous SOUTHERN or WESTERN EDITION).

PREFACE.

This Publication has received at all hands a cordial welcome and grateful preservation. The contents represent months of research and solicitation, of patient observation and incessant labor; and although the Book was originally compiled for Personal use, the knowledge that it would be found useful to EVERY dealer in Hardware and Metals, has caused its publication and extended distribution under the advertising patronage of so many Representative Houses.

Its future value can only be assured by making those Advertisers believe that it fills its mission of usefulness, and is kept by the Dealer who receives it, and who, in his quest for information corresponds with its many Advertisers, asking them for Catalogues and quotations; at the same time increasing the value of "Handy Notes and Queries," by stating it was among its pages the advertisement was seen which suggested the application.

The necessity for a Handy Book of Reference similar to this has been manifest for a great many years; and that such a compilation would prove of undoubted utility, has been often experienced by dealers in the various articles to which this work refers.

It is no doubt true that many books have been already published, which, singly or collectively, contain nearly all the items of information carefully embodied in this, but most of them are works of limited circulation, not readily obtained, and frequently costing a price that places them beyond the reach of many dealers most apt to need the information.

This work has been compiled from a multitude of sources with a great degree of care, and the information herein contained will be found quite reliable, and from the scarcity of similar publications, should naturally recommend its careful preservation.

By comparison with Haswell, Trautwine and other authorities, these tables will be more easily understood by practical mechanics, and consequently found susceptible of an immediate simple demonstration without going thro' prescribed forms of computation, natural enough to those whose education has been of a technical character, but thoroughly bewildering to most of us who have "risen from the ranks."

Wherever possible I have refrained from following the "Haswell" method of expressing all sizes by decimal notation; thinking it simpler to say 3-16, instead of .1875; 5-16, instead of .3125; &c., the desired information being more easily obtained without the necessity of using mentally an unfamiliar process of reduction.

My principal object has been to be of some service to those following my own business, feeling confident from the assistance I have myself so frequently received, by having these "Handy Notes" within reach will also be appreciated by them. Thus they may often save many moments of anxious worry over unexpected problems that may occur in every day work.

H. H.

TOWER & LYON,

MANUFACTURERS OF

SPECIALTIES IN HARDWARE,

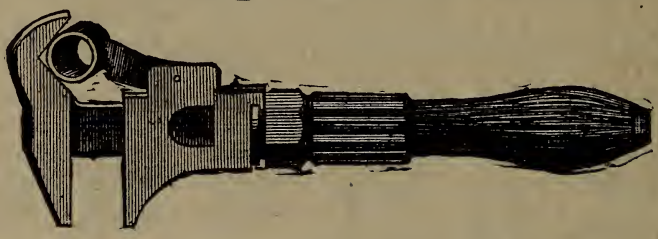
NOS. 95 CHAMBERS ST. & 77 READE ST.

CHAPLIN'S

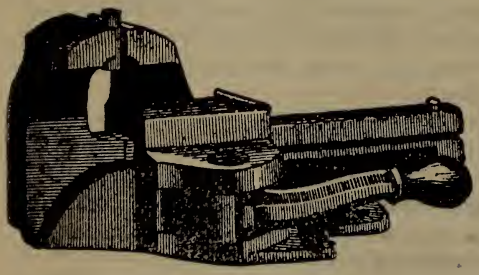
Iron and Wood Bottom

PLANES

Patent Engineer's Wrenches,



CHAMPION SCREW-DRIVERS.



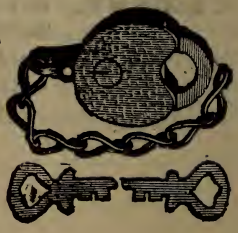
SOLE MANUFACTURERS

OF THE

STEPHENS PATENT VISES.

Brass and Iron and Scandinavian

PADLOCKS,



Police Equipments, Lanterns, &c.

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PERFECTION.

BUSHNELL'S PRICE BOOK,

For the Convenience of Business Men

IN ALL LINES OF TRADE,

BUT ESPECIALLY THE HARDWARE DEALER.

This Book was not offered to the Public until October, 1883, but thousands who are now using it can testify to its usefulness.

WHAT IT IS.

BUSHNELLS' PRICE BOOK is a neat, substantially bound book of 200 pages, made of first-class stock, conveniently and tastefully indexed, handsomely ruled and headed. It is manufactured for the publisher by one of the best blank book manufacturers in New York, and no expense has been spared to make it the finest book in the market, the neatness and convenience of which will commend it at once.

There is no other price book in the market, sold at anything like an equal figure, that compares with it. It was developed by years of experience in business, and the need of a *practical* price book was the means of bringing this before the public.

To the business man who never kept a price book, a few weeks' trial of it will demonstrate its advantages, and he will never dispense with it.

No business, great or small, can afford to do without it.

With one of them at his service, a minute's work with the pencil, on the arrival of new goods, *records the cost* of them in a convenient shape for almost *instantaneous reference* at any future time—no matter how far distant.

The advantages of this when purchasing or selling goods are self-evident. At the same time, *your selling price is recorded for as convenient reference;* and you thus have the cost and price of your entire stock in a book which may be carried in the pocket or kept on the desk.

In time saved from searching for old invoices, in money saved in buying, and in the *preservation of prices* of goods from which the *marks have been torn or obliterated*, the book will pay for itself many times, the first month it is used.

Jobbing houses will find it admirably adapted to the *pocket* of the *Traveling Man*, for *Salesmen* at home, or for *Office Use.*

PRICES:

INCLUDING AS A PREMIUM, A COPY OF "HANDY NOTES AND QUERIES,"

BY MAIL PREPAID.

No. 1, Cloth,	per copy,	$1.50.
No. 2, Seal Morocco,	" "	2.00.
No. 3, Red Russia,	" "	2.50.

Please remit by Draft, Money Order, or Postal Note.

Responsible parties may order and remit on receipt of the books, if preferred.

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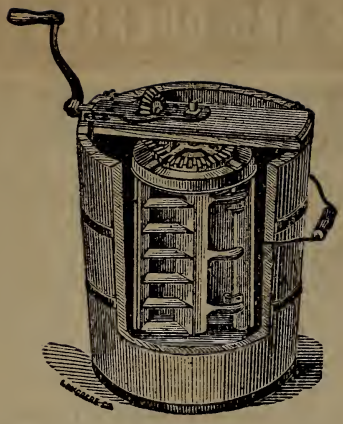
85 CHAMBERS STREET, NEW YORK.



CHAS. W. PACKER'S

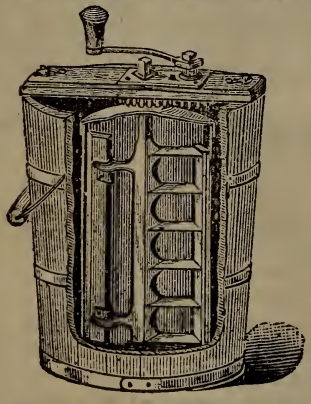
"STANDARD"

Ice Cream Freezers

Easily Operated, Simple in Construction, Rapid and Efficient in Work, Well Made, Strong and Durable.

All the Castings are Galvanized or Tinned; Tubs of WHITE CEDAR, with Galvanized Hoops. Pine Tubs that require to be chemically filled to render waterproof are not used in the Packer Freezers. The beater, to which is attached Deflectors and Lifters, has self-adjusting vibratory Scalping-Bar. The mechanical arrangements guarantee the Freezing of Cream, Fruits, Ices, &c., in the shortest time and most satisfactory manner.

CHAS. W. PACKER'S
MODEL ICE CREAM FREEZER



Is offered as possessing the advantages of higher-priced Freezers at less cost, the simplicity of construction admitting a lower price list. They are made from the best qualities of materials, including White Cedar Pails with Galvanized Hoops, Galvanized and Tinned Castings, extra grade Tin Plate, &c. The Can has Cast-iron Cover and Bottom, and may be revolved after the Dasher has been removed. The Dasher has self-adjusting scraping bar, and is designed with special reference to rapid freezing.

C. W. PACKER, Manufacturer,
PHILADELPHIA.

For Sale by Wholesale Dealers in all of the Principal Cities.

BUSINESS LAW IN DAILY USE.

The following compilation of business law contains the essence of a large amount of legal verbage:

If a note is lost or stolen, it does not release the maker; he must pay it, if the consideration for which it was given and the amount can be proven.

Notes bear interest only when so stated.

Principals are responsible for the acts of their agents.

Each individual in a partnership is responsible for the whole amount of the debts of the firm, except in cases of special partnership.

Ignorance of the law excuses no one.

The law compels no one to do impossibilities.

An agreement without consideration is void.

A note made on Sunday is void.

Contracts made on Sunday cannot be enforced.

A note by a minor is void.

A contract made with a minor is void.

A contract made with a lunatic is void.

A note obtained by fraud, or from a person in a state of intoxication, cannot be collected.

It is a fraud to conceal a fraud.

Signatures made with a lead pencil are good in law.

A receipt for money is not always conclusive.

The acts of one partner bind all the rest.

"Value received" is usually written in a note, and should be, but is not necessary. If not written it is presumed by the law, or may be supplied by proof.

The maker of an "accommodation" bill or note (one for which he has received no consideration, having lent his name or credit for the accommodation of the holder) is not bound to the person accommodated, but is bound to all other parties, precisely as if there was a good consideration.

No consideration is sufficient in law if it be illegal in its nature.

Checks or drafts must be presented for payment without unreasonable delay.

Checks or drafts should be presented during business hours, but in this country, except in the case of banks, the time extends through the day and evening.

If the drawee of a check or draft has changed his residence, the holder must use due or reasonable diligence to find him.

If one who holds a check as payee or otherwise, transfers it to another, he has a right to insist that the check be presented that day, or, at farthest, on the following day.

A note indorsed in blank (the name of the indorser only written) is transferable by delivery, the same as if made payable to bearer.

If the time of payment of a note is not inserted, it is held payable on demand.

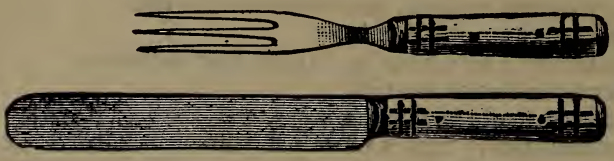
NORTHAMPTON CUTLERY CO.,

N. Y. Salesroom, 122 Chambers St., Only.
Office and Factory, Northampton, Mass.

MANUFACTURERS OF

SUPERIOR TABLE CUTLERY

OF EVERY DESCRIPTION.



With Cocoa, Ebony, Bone, Rubber, Celluloid, Ivory and Plated Handles, including an Assortment of

CARVERS and PATENT GUARD FORKS

of the latest and most approved designs.

FRENCH COOKS' KNIVES

Tempered and ground especially for Professional use.

BUTCHER, HUNTING, STICKING & SKINNING KNIVES

In all the usual styles of perfect finish and guaranteed quality.

A full assortment of these very desirable Goods can be obtained from

ANY OF THE LEADING JOBBING HOUSES IN THE UNITED STATES.

BUSINESS LAW IN DAILY USE.----Continued.

The time of payment of a note must not depend upon a contingency. The promise must be absolute.

A bill may be written upon any paper, or substitute for it, either with ink or pencil.

The payee should be distinctly named in the note, unless it is payable to bearer.

An indorsee has a right of action against all whose names were on the bill when he received it.

If the letter containing a protest of non-payment be put into the post office, any miscarriage does not affect the party giving notice.

Notice of protest may be sent either to the place of business or of residence of the party notified.

The holder of a note may give notice of protest either to all the previous indorsers or only to one of them; in case of the latter he must select the last indorser, and the last must give notice to the last before him, and so on. Each indorser must send notice the same day or the day following. Neither Sunday or legal holiday is to be counted in reckoning the time in which notice is to be given.

The loss of a bill or note is not sufficient excuse for not giving notice of protest.

If two or more persons as partners are jointly liable on a note or bill, due notice to one of them is sufficient.

If a note or bill is transfered as security, or even as payment of a pre-existing debt, the debt revives if the bill or note be dishonored.

An indorsement may be written on the face or back.

An indorser may prevent his own liability to be sued by writing "without recourse," or similar words.

All claims which do not rest upon a seal or judgment must be sued within six years from the time when they arise.

Part payment of a debt which has passed the time of statutory limitation revives the whole debt, and the claim holds good for another period of six years from the date of such partial payment.

A verbal promise to pay, made without condition, is generally held as sufficient to revive a claim otherwise shut out by the law of limitation.

If, when a debt is due, the debtor is out of the State, the "six years" do not begin to run until he returns. If he afterward leave the State, the time forward counts the same as if he remained in the State.

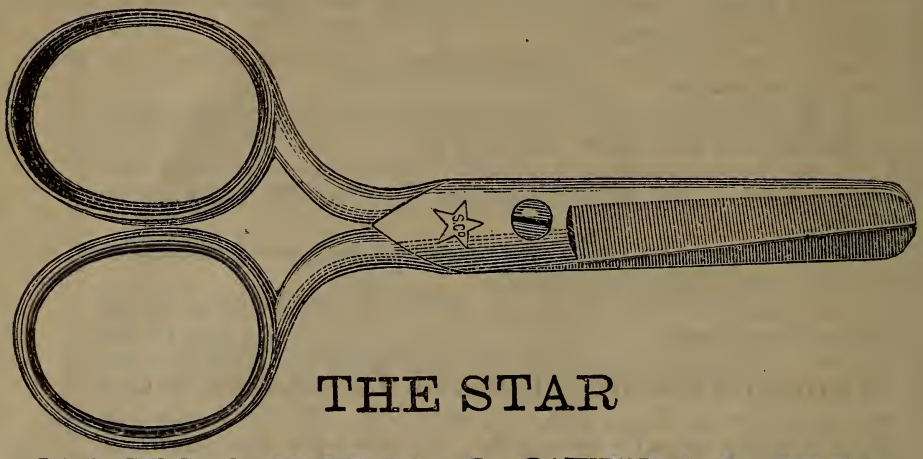
An oral agreement must be proved by evidence. A written agreement proves itself. The law prefers written to oral evidence because of its precision.

No evidence may be introduced to contradict or vary a written contract; but it may be received in order to explain it, when such contract is in need of explanation.

Wm. Schollhorn & Co.

NEW HAVEN, CONN.

MANUFACTURERS OF

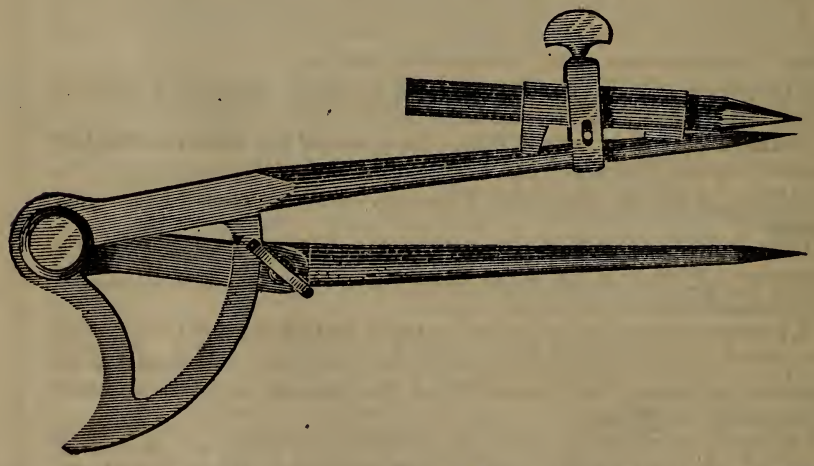


THE STAR

SCISSORS & SHEARS.

Full Line of Straight and Bent Trimmers, Bankers' and Paper Shears, Barbers' Shears, Ladies, Embroidery Pocket and Buttonhole Scissors.

WARRANTED SUPERIOR QUALITY. FULL NICKEL-PLATED.



THE EXCELSIOR DIVIDER AND PENCIL HOLDER.

The Divider points are made of STUBS' STEEL WIRE. The Pencil Holder can be attached to any Divider.

WRITE FOR CATALOGUE AND PRICE LIST.

Bills of Exchange, Drafts, Acceptances.

A Bill of Exchange or Draft is an order drawn by one person or firm upon another, payable either at sight or at a stated future time.

It becomes an "Acceptance" when the party upon whom it is drawn writes across the face "Accepted," and signs his name thereto, and is negotiable and bankable the same as a note, and subject to the same laws.

In many States both Sight and Time drafts are entitled to three days grace, the same as notes; but if made in form of a bank check, "pay to," without the words "at sight," it is payable on presentation without grace.

Demand Notes are payable on presentation without grace, and bear legal interest, after a demand has been made, if not so written. An endorser on a demand note is holden only for a limited time, variable in different States.

A Negotiable Note must be made payable either to bearer, or be properly endorsed by the person to whose order it is made. If the endorser wishes to avoid responsibility, he can endorse "without recourse."

A Joint Note is one signed by two or more persons, who each become liable for the whole amount.

Three Days' Grace are allowed on all time notes, after the time for payment expires; if not then paid, the endorser, if any, should be legally notified, to be holden.

Foreign Exchange, Value of U. S. Coins, etc.

The value of One Pound Sterling or an English Sovereign, compared with old U. S. coins, is $4.44, but Congress has, from time to time, reduced the weight and purity of U. S. coins, making their value as metals less than their value as coins, and has established the present legal value of a Pound Sterling at $4.84. Exchange is based on the old or nominal value of a Pound, so that when exchange is said to be at 9 per cent. premium, it is then at par value; when below 9 per cent., it is below par; and when above 9 per cent., above par, etc.

Copartnerships.

Partnerships may be either general or special. In general partnerships, money invested ceases to be individual property. Each member is made personally liable for the whole amount of debts incurred by the company. The company is liable for all contracts or obligations made by individual members.

Special Partners are not liable beyond the amount contributed.

A person may become a partner by allowing people generally to presume that he is one, as, by having his name on the sign, or parcels, or in the bills used in the business.

A share or specific interest in the profits or loss of a business, as remuneration for labor, may involve one in the liability of a partner.

In case of Bankruptcy, the joint estate is first applied to the payment of partnership debts, the surplus only going to the creditors of the individual estate.

A Dissolution of partnership may take place under express stipulations in the articles of agreement, by mutual consent, by the death or insanity of one of the firm, by award of arbitrators, or by court of equity in cases of misconduct of some member of the firm

A partner signing his individual name to negotiable paper, which is for the use of the partnership firm, binds all the partners thereby. Nogotiable paper of the firm, even though given on private account by one of the partners, will hold all the partners of the firm when it passes into the hands of holders who are ignorant of the fact attending its creation.

Partnership effects may be bought and sold by a partner; he may make contracts; may receive money; endorse, draw, and accept bills and notes; and while this may be for his own private account, if it apparently be for the use of the firm, his partners will be bound by his action, provided the parties dealing with him were ignorant of the transaction being on his private account; and thus representation or misrepresentation of a partner, having relation to business of the firm, will bind the members in the partnership.

In case of Death, the surviving partners must account to the representatives of the deceased.

Simple Method of Calculating Interest.

We take 6 per cent. as basis for calculating all rates.

Multiply the amount by number of days and divide by 6000; or, which is the same thing, multiply by number of days, remove the decimal point three figures to the left and divide by 6. This gives the interest at 6 per cent.

For	2 per cent.	take	one-third.
For	3 per cent.	take	one-half.
For	4 per cent.	*deduct*	one-third.
For	5 per cent.	*deduct*	one-sixth.
For	7 per cent.	*add*	one-sixth.
For	8 per cent.	*add*	one-third.
For	9 per cent.	*add*	one-half.
For	10 per cent.	*add*	two-thirds.

The following example shows the simplicity:

Interest on $950.40 for 212 days.

950.40
212
190080
95040
190080
6) 201.484.80
33.58

Interest @ 6 per cent,		33.58
" " 2 " "	⅓ of 33.58	11.19
" " 3 " "	½ of 33.58	16.79
	33.58	
" " 4 " "	⅓ off 11.19	22.39
	33.58	
" " 5 " "	⅙ off 5.59	27.99
	33.58	
" " 7 " "	add ⅙ 5.59	39.17
	33.58	
" " 8 " "	add ⅓ 11.19	44.77
	33.58	
" " 9 " "	add ½ 16.79	50.37
	33.58	
" " 10 " "	add ⅔ 22.38	55.96

ANY rate can be calculated upon the same principle.

Contributed by Jesse Lee and Son, Philadelphia, Pa.

Time at which Money Doubles at Interest.

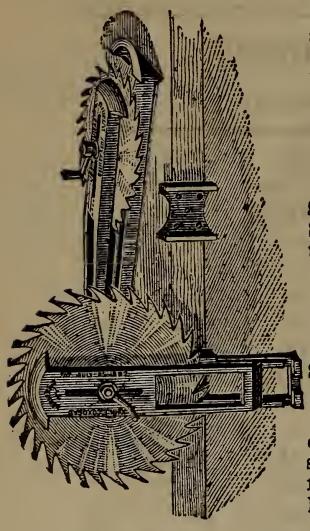
Rate per cent.	Simple Interest.	Compound Interest.
2	50 years.	35 years 1 day.
2½	40 years.	28 years 26 days.
3	33 years 4 months.	23 years 164 days.
3½	28 years 208 days.	20 years 54 days.
4	25 years.	17 years 246 days.
4½	22 years 81 days.	15 years 273 days.
5	20 years.	15 years 75 days.
6	16 years 8 months.	14 years 327 days.
7	14 years 104 days.	10 years 89 days.
8	12½ years.	9 years 2 days.
9	11 years 40 days.	8 years 16 days.
10	10 years.	7 years 100 days.

ONE DOLLAR LOANED 100 YEARS at Compound Interest would amount to the following sum:

1 per cent	$2.75	12 per cent	$84,675.00
3 " "	19.25	15 " "	1,174,405.00
6 " "	340.00	18 " "	15,145,207.00
10 " "	13,809 00	24 " "	2,551,799,404.00

Coxhead's Combined Saw Vise and Set.

PATENTED JULY 25, 1882.



No. 2—For Hand Saws—Will hold to file and set any saw, from the smallest to the largest. In using it for *setting* keep the bolt up against the back of the saw, to prevent any slipping back. The Anvil has four bevels. The jaws are all planed.

Price, $1.50.

Weight of No. 2, 8 *lbs.*

No. 3—For Hand, Band or Scroll Saws—Will hold any size of Band or Hand Saw. This is intended for shop use, being too heavy to carry about.

Price, $2.25.

Improved Saw Vise—Same as Nos. 2 and 3, but without the Set.

Price, 85c. and $1.25.

3 B—This Tool fitted up with Guides for filing and setting Band Saws *on the frame.* **Price, $2.50.**

Weight of No. 3, 13 *lbs.*

No. 4—This size will hold Circular Saws from 7 to 18 inches in diameter. By taking off the front Jaw the bolt can be moved to suit any size between. Price, $3.50. **No. 5**—Will hold any size from 7 to 26 inches in diameter, for filing and setting. Price, $4.50. **No. 6**—From 5 to 10 inches. Price, $2.50.

No. 4, *weight* 23 *lbs.* *No.* 5, *weight* 35 *lbs.*

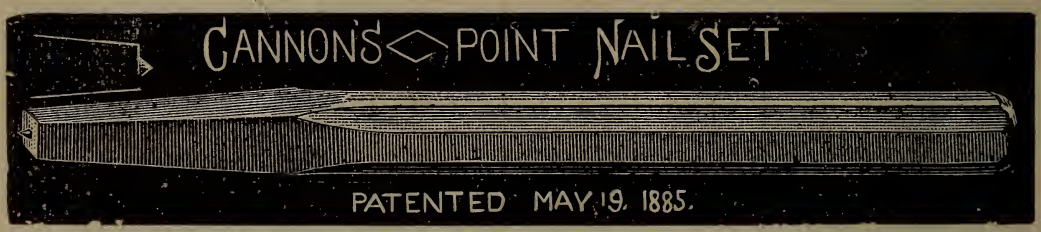
These Tools are very efficient and highly prized by all who use them.

Send for Catalogue and Trade Discount.

MANUFACTURED BY

JOHN F. COXHEAD, Poughkeepsie, N. Y.

FOR SALE BY **QUACKENBUSH, TOWNSEND & CO.,**
85 CHAMBERS ST., NEW YORK.



The object of this DIAMOND POINT can be readily seen, in that it prevents the SET from slipping from the head of the nail while in use, thus saving in many cases some valuable piece of work.

It is fast taking the place of every other Nail Set.
Once seen, Mechanics will have no other.

These Sets are carefully made from the Best Quality of Tool Steel. The Points are turned and thoroughly tempered, and will not break off.

EACH SET FULLY WARRANTED.

The Trade Supplied. Put up in Boxes 1 Dozen, 1-4 Gross and 1 Gross. Assorted Sizes. Prices and Terms upon application. Manufactured only by

THE EDWARD STORM SPRING CO., Limited,

POUGHKEEPSIE, N. Y.

Rate of Annual Income of Investments,

PAR VALUE BEING $100, BEARING INTEREST AT

Price paid.	5%	6%	7%	8%	10%
$50	10.00	12.00	14.00	16.00	20.00
55	9.09	10.90	12.72	14.55	18.18
60	8.33	10.00	11.66	13.33	16.66
65	7.69	9.23	10.76	12.30	15.38
70	7.14	8.57	10.00	11.42	14.28
75	6.66	8.00	9.33	10.66	13.35
80	6.25	7 50	8.75	10.00	12.50
82½	6.06	7.27	8.48	9.69	11.12
85	5.88	7.05	8.23	9.41	11.76
87½	5.71	6.85	8.00	9.14	11.42
90	5.55	6.66	7.77	8.88	11.11
92½	5.40	6.48	7.56	8.64	10.80
95	5.26	6.31	7.36	8.42	10 52
96	5.20	6.25	7.29	8.33	10.41
97	5.15	6.18	7.21	8.24	10.30
97½	5.12	6.15	7.17	8.20	10.25
98	5.10	6.12	7.14	8.16	10.20
99	5.05	6.06	7.07	8.08	10.10
100	5.00	6.00	7.00	8.00	10.00
101	4.95	5.94	6.93	7.92	9.90
102	4.90	5.88	6 86	7.84	9.80
103	4.85	5.82	6.79	7.76	9.70
104	4.80	5.76	6.73	7.69	9.61
105	4.76	5.71	6.66	7.61	9.52
110	4.54	5.45	6.36	7.27	9.09
115	4.34	5.21	6.08	6.95	8.69
120	4.16	5.00	5.83	6.66	8.33
125	4.00	4.80	5.60	6.40	8.00
130	3.84	4.61	5.38	6.15	7.69
135	3.70	4.44	5.18	5 92	7.40
140	3.57	4.28	5.00	5.71	7.14
145	3.44	4.13	4.82	5.51	6.89
150	3.33	4.00	4.66	5.33	6.66

Interest Rules.

FOUR PER CENT.—Multiply the principal by the number of days to run; separate the right hand figure from product, and divide by 9.

FIVE PER CENT.—Multiply by number of days, and divide by 72

SIX PER CENT.—Multiply by number of days; separate right hand figure, and divide by 6.

SEVEN AND THREE-TENTHS PER CENT.—Multiply by number of days, and double the amount so obtained. On $100 the interest is just two cents per day.

EIGHT PER CENT.—Multiply by number of days, and divide by 45.

NINE PER CENT.—Multiply by number of days; separate right hand figure, and divide by 4.

TEN PER CENT.—Multiply by number of days, and divide by 36.

TWELVE PER CENT.—Multiply by number of days; separate right hand figure, and divide by 3.

BISSELL CARPET SWEEPER CO.

FACTORY:
GRAND RAPIDS, MICH.

EASTERN BRANCH:
103 CHAMBERS STREET,
NEW YORK, U. S. A.

The Largest and Only Exclusive Manufacturers of Carpet Sweepers in the World

Manufacturing over Twenty Different Styles and embodying every desirable feature known under 35 Patents and Patents Pending.

Bissell, No. 5.—Opening at the top. Sweeps closer to the sur-base than any other Sweeper.

The motive power in all of the Sweepers of our manufacture consists in the Friction Wheel, which is conceded to be the only EFFECTIVE and POSITIVE MOTIVE POWER ever produced in Sweepers. Being exclusive manufacturers of

CARPET SWEEPERS

we are in a position to meet any competition that may arise.

Crown Jewel, No. 3.—A strong, durable and finely-finished four-wheeled Sweeper.

We are constantly adding new improvements to our several Brands and invite your inquiries from time to time for Price-Lists and Descriptive Circulars.

All Sweepers of our Manufacture are Warranted.

"THE GRAND RAPIDS,"
The most Popular Sweeper in the World.

SEND FOR PRICE-LIST AND DESCRIPTIVE CIRCULARS.

Total Value of Articles by the Piece, Reckoned from 1 to 1 Dozen.

1.....	8⅓	10 5/12	12½	14 7/12	16⅔	18¾	20 5/6	22½	25	29⅙	31¼	33⅓	35 5/12	37½	39 7/12	41⅔	43¾	45 5/6	47½	50
2.....	17	21	25	29	33	38	42	46	50	58	63	67	71	75	79	83	88	92	96	1.00
3.....	25	31	38	44	50	56	63	69	75	88	94	1.00	1.06	1.13	1.19	1.25	1.31	1.38	1.44	1.50
4.....	33	42	50	56	67	75	83	92	1.00	1.17	1.25	1.33	1.42	1.50	1 58	1.67	1.75	1.83	1.92	2.00
5.....	42	52	63	73	83	94	1.04	1.15	1.25	1.46	1.56	1.67	1.77	1.88	1.98	2.08	2.19	2.29	2.40	2.50
6.....	50	63	75	88	1.00	1.13	1.25	1.38	1.50	1.75	1.88	2.00	2.13	2.25	2.34	2.50	2.63	2.75	2.87	3.00
7.....	58	73	88	1.02	1.17	1.31	1.46	1.60	1.75	2.04	2.19	2.33	2.48	2.63	2.77	2.92	3.06	3.21	3.35	3.50
8.....	67	83	1.00	1.17	1.33	1.50	1.67	1.83	2.00	2.33	2.50	2.67	2.83	3.00	3.17	3.33	3.50	3.67	3.83	4.00
9.....	75	94	1.13	1.29	1.50	1.69	1.88	2.06	2.25	2.63	2.81	3.00	3.19	3.38	3.56	3.75	3.94	4.13	4 31	4.50
10.....	83	1.04	1.25	1.46	1.67	1.88	2.08	2.29	2.50	2.92	3.13	3.33	3.54	3.75	3.96	4 17	4.38	4.58	4.79	5.00
11.....	92	1.15	1.38	1.60	1.83	2.06	2.29	2.52	2.75	3.21	3:44	3.67	3.89	4.13	4.23	4.58	4.81	5.04	5.27	5.50
12.....	1.00	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.50	3.75	4.00	4.25	4.50	4.75	5.00	5.25	5.50	5.75	6.00

1.....	52 1/12	54⅙	56¼	58⅓	60 5/12	62½	64 7/12	66⅔	68¾	70 5/6	72 1/12	75	77 1/12	79⅙	81¼	83⅓	87½	91⅔	95 5/6	1.00
2.....	1.04	1.08	1.13	1.17	1.21	1.25	1.29	1.33	1.38	1.42	1.46	1.50	1.54	1.58	1.63	1.67	1.75	1.83	1.92	2.00
3.....	1.56	1.63	1.69	1.75	1.81	1.88	1.94	2.00	2.06	2.13	2.19	2.25	2.31	2.38	2.44	2.50	2.63	2 75	2.88	3.00
4.....	2.08	2.17	2.25	2.33	2.42	2.50	2.58	2.67	2.75	2.83	2 92	3.00	3.08	3.17	3.25	3.33	3.50	3.67	3.83	4.00
5.....	2.60	2.71	2.81	2.92	3.02	3.13	3.23	3.33	3.44	3.54	3.65	3.75	3.85	3.96	4.06	4.17	4.38	4.58	4.79	5.00
6.....	3.13	3.25	3.38	3.50	3.63	3.75	3.88	4.00	4.13	4.25	4.38	4.50	4.63	4.75	4.88	5.00	5.25	5.50	5.75	6.00
7.....	3.65	3.79	3.94	4.08	4.23	4.38	4.52	4.67	4.81	4.96	5.10	5.25	5.40	5.54	5.69	5.83	6.13	6.42	6.71	7.00
8.....	4.17	4.33	4.50	4.67	4.93	5.00	5.17	5.33	5.50	5.67	5.83	6.00	6.15	6.33	6.50	6.67	7.00	7.33	7.66	8.00
9.....	4.69	4.88	5.06	5.25	5.44	5.63	5.81	6.00	6.19	6.38	6.56	6.75	6.94	7.13	7.31	7.50	7.88	8.25	8.62	9.00
10.....	5.21	5.42	5.63	5.83	6.04	6.25	6.46	6.67	6.88	7.08	7.29	7.50	7.71	7.92	8.13	8.33	8.75	9.17	9.58	10.00
11.....	5.73	5 96	6.19	6.42	6.65	6.88	7.11	7.33	7.56	7.79	8.02	8.25	8.48	8.71	8.94	9.17	9.63	10.08	10.54	11.00
12.....	6.25	6.50	6.75	7.00	7.25	7.50	7.75	8.00	8.25	8.50	8.75	9.00	9.25	9.50	9.75	10.00	10.50	11.00	11.50	12.00

JOHNSTON'S

Patent Standard Dry-Sized

KALSOMINE AND FRESCO PAINTS,

FOR COLORING WALLS AND CEILINGS.

Gold Medal, New Orleans, 1884-5, and Eight First-Class Awards.

Nine-Tenths Cheaper than Wall Paper. Three-Fourths Cheaper than Oil Paint.

READY

FOR USE.

Pure White and Beautiful Tints. **Purifies and Beautifies.**
Will not Rub and Scale from the Wall.
Invaluable in Cleansing and Disinfecting Walls Impregnated with Germs of Disease.
Mixed in 5 Minutes Ready for the Brush, by the addition of Water Only.
An Inexperienced Person can use it.
Five Pounds will Cover with a Good Body 500 Square Feet, on a Hard-Finished Wall.

ASK FOR

Johnston's Patent Dry-Sized

KALSOMINE,

and see that you do not get any poor substitute. For sale by Paint, Drug and Hardware Dealers everywhere.

Send for Sample Card and Circular to

DRY KALSOMINE AND FRESCO PAINT WORKS,

Nos. 25 & 27 John St.,

BROOKLYN, N. Y.

Poisons and their Antidotes.

ARSENIC.—Use the stomach pump instantly; otherwise, give 20 grains sulphate of zinc in a little warm water to produce vomiting, or a large table spoonful of mustard in warm water. Meanwhile procure some *hydrated sesquioxide of iron* and give a tablespoonful of it with water every five or ten minutes until six doses are taken. *Dialyzed iron* is also efficient.

AQUA AMMONIA, or HARTSHORN, if taken undiluted is a violent poison. Give *Vinegar*, instantly, mixed with a little water, this acts by neutralization. Vegetable oils, in large quantity, furnish the next best antidote, the ammonia acting upon them to form Soap.

ACONITE.—Give an emetic of mustard or sulphate of zinc, or use the stomach pump, instantly, then give stimulants, whiskey, brandy, gin or rum, &c.

ACID—NITRIC, MURIATIC, or SULPHURIC.—If either of these be swallowed, not a moment is to be lost. The best remedy is to fill the patient FULL of *Calcined Magnesia* stirred up in water, to the consistency of very thin paste; or, give half an ounce of soap shavings in a pint of water. If neither are at hand give chalk or whiting, in water, or even pound fine some of the white plastering from the wall and give in water

BELLADONNA, HYOSCYAMUS, STAMONIUM, and CONIUM are all narcotics, and the treatment is the same as for opium; *especially the strong coffee.*

CANTHARIDES (Spanish Flies).—Give large doses of sweet oil, sugar and water, or milk. To relieve the strangury and scalding of urine whice it occasions, give camphor, 10 to 15 drop doses in water.

CORROSIVE SUBLIMATE, (Bed bug poison).—Mix up quickly the *whites of a dozen eggs*, with a quart of cold water, give a cupful of the mixture every two minutes till the stomach can hold no more. If you have not eggs enough use what you have and make up the deficiency with *milk*. Wheat flour, mixed with water, is good. Use the stomach pump if it can be had quickly.

CHARCOAL GAS, SULPHURETTED HYDROGEN, or CARBONIC ACID GAS.—Use cold shower bath and give Aconite in drop doses, in a spoonful of water. The effects of *Coal gas* are best antidoted by copious draughts of vinegar and water.

OXALIC ACID.—Give *Magnesia* in water as quickly as possible. When not to be had, use chalk, lime or saleratus. Use the stomach pump if at hand. Soap suds or alkalies are of no use with this Acid.

OPIUM, MORPHINE and LAUDANUM.—Use the stomach pump, if possible; if not, a powerful emetic, as sulphate of zinc; or, give the mustard emetic and tickle the palate. If drowsiness comes on, take the patient into the open air; dash water into the face, *by all means keep him walking.* If once allowed to fall asleep it may be impossible to arouse him. Strong coffee, taken hot, antidotes after the stomach has been emptied.

PRUSSIC ACID.—This is the deadliest of all known poisons. One drop of the *pure acid* will cause instantaneous death. If any of its products be taken and the result is not immediately fatal, resort to the cold shower bath, inhalation of diluted *aqua ammonia* vapor and give solution of carbonate of potass, 20 grains to a glass of water, or ammonia diluted with six times the bulk of water, freely.

SUGAR OF LEAD, (Acetate of Lead).—Give a ground mustard emetic; or, 20 grains sulphate of zinc in a glass of water; afterwards, large dose of epsom salts.

STRYCHNINE or NUX VOMICA, are rapid and deadly poisons, generally proving fatal, in spite of treatment. If emetics are given and the stomach emptied quickly enough, and if the patient is not attacked with convulsions within two hours, he will generally be safe. An abundance of sweet milk is recommended, also strong coffee, as for opium poisoning.

STRONG LYE.—Sometimes swallowed by children. The remedy is *vinegar, or oil*, the former by converting the lye into acetate of potash, the latter by forming soap; neither of which materially injures the stomach.

VERDIGRIS.—This most frequently poisons by its formation upon copper vessels used in cooking. Give an *emetic* instantly, and then two teaspoonfuls of *Carbonate of Soda*, in a tumbler full of water and repeat in ten minutes. Whites of eggs in water are also proper.

WEIGHTS AND MEASURES.

Avoirdupois Weight.

The Grain is the same in Troy, Apothecaries and Avoidupois Weights.

The standard avoirdupois pound is the weight of 27.7015 cubic inches of distilled water weighed in the air at 35.85 degrees Fahr., barometer at 30 inches.

27.343 grains = 1 drachm.

drachms.	ozs.	lbs.	qrs.	cwt.	ton.	French grammes.
1 =	.0625 =	.0039 =	000139 =	.000035 =	.00000174 =	1.771846
16 =	1 =	.0625 =	.00223 =	.000558 =	.000028 =	28.34954
256 =	16 =	1 =	.0357 =	.00893 =	.000447 =	453.59
7168 =	448 =	28 =	1 =	.25 =	.0125 =	12700
28672 =	1792 =	112 =	4 =	1 =	.05 =	50802
573440 =	35840 =	2240 =	80 =	20 =	1 =	1016040

A stone = 14 pounds. A quintal = 100 pounds

Troy Weight.

For Gold, Silver and Precious Metals.

grains.	dwts.	ozs.	lbs.	French grammes.
1 =	.04167 =	.00208 =	.0001736 =	.9648
24 =	1 =	.05 =	.004167 =	1.555
480 =	20 =	1 =	.0833 =	31.1035
5760 =	240 =	12 =	1 =	373.242

175 lbs. Troy = 144 Avoirdupois.
lbs. Avoirdupois X .82286 = lbs. Troy.
lbs. Troy X 1.2153 = lbs. Avoirdupois.

The jeweler's Carat is equal, in the United States, to 3.2 grains; in London, to 3.17 grains; in Paris, to 3.18.

Pure Gold is worth $20.67 per oz. Troy, or $[illegible] per oz. Avoirdupois.
" Silver " $1.36 " " $1.24 " "
Standard Gold " $18.60 " " $16.96 " "
" Silver " $1.225 " " $1.117 " "

Apothecaries' Weight.

United States and British.

20 grains..... 1 scruple.
3 scruples..... 1 drachm = 60 grains.
8 drams..... 1 ounce = 24 scruples = 480 grains.
12 ounces..... 1 pound = 96 drachms = 288 scruples = 5760 grs.

In Troy and Apothecaries' weights, the grain, ounce and pound are the same.

Long Measure.

ins.	feet.	yards.	fath.	poles.	furl.	mile.	French metres.
1 =	.083 =	.02778 =	.0139 =	.005 =	.000126 =	.0000158 =	.0254
12 =	1 =	.333 =	.1667 =	.0606 =	.00151 =	.0001894 =	.3048
36 =	3 =	1 =	5 =	.182 =	.00454 =	.000568 =	.9144
72 =	6 =	2 =	1 =	.364 =	.0091 =	.001136 =	1.8287
198 =	16½ =	5½ =	2¾ =	1 =	.025 =	.003125 =	5.0291
7920 =	660 =	220 =	110 =	40 =	1 =	.125 =	201.16
63360 =	5280 =	1760 =	880 =	320 =	8 =	1 =	1609.315

A cable's length = 120 fathoms.

A square mile is 640 acres.
A league is three miles.
The term "Sabbath Day's Journey" means 1,155 yards.
A day's journey is 33⅓ miles.
A fathom is six feet.

A hand (horse measure) is four inches.
A palm is three inches.
A span is 10⅞ inches.
A cubit is two feet.
A great cubit is 11 feet.
A pace is three feet.

Surveying Measure (Lineal).

ins.	links.	feet.	yards.	chains.	mile.	French metres.
1 =	.126 =	.0833 =	.0278 =	.00126 =	.0000158 =	.0254
7.92 =	1 =	.66 =	.22 =	.01 =	.000125 =	.2012
12 =	1.515 =	1 =	.333 =	.01515 =	.000189 =	.3048
36 =	4.545 =	3 =	1 =	.04505 =	.000568 =	.9144
792 =	100 =	66 =	22 =	1 =	.0125 =	20.116
63360 =	8000 =	5280 =	1760 =	80 =	1 =	1609.315

1 knot or geographical mile = 6082.66 feet = 1854 metres = 1.152 statute mile.
1 Admiralty knot = 1.1515 statute miles = 6080 feet.

Table of Quantities.

12 units or articles,	1 dozen.	20 quires	1 ream.
12 dozen	1 gross.	2 reams	1 bundle.
20 units or articles,	1 score.	5 bundles	1 bale.
24 sheets paper,	1 quire.	Printer's token,	250 sheets.

Wm. Rose & Bros.,

MANUFACTURERS OF

BRICKLAYERS' TOOLS:

Trowels, Hammers, Chisels and Steels.

PLASTERERS' TOOLS:

Trowels, Mitering Tools and Rules.

SADDLERS' TOOLS:

Round Knives, Head Knives, etc.

MOULDERS' TOOLS:

Trowels, Double-Enders, Lifters and Slickers.

CURRIERS' BLADES.

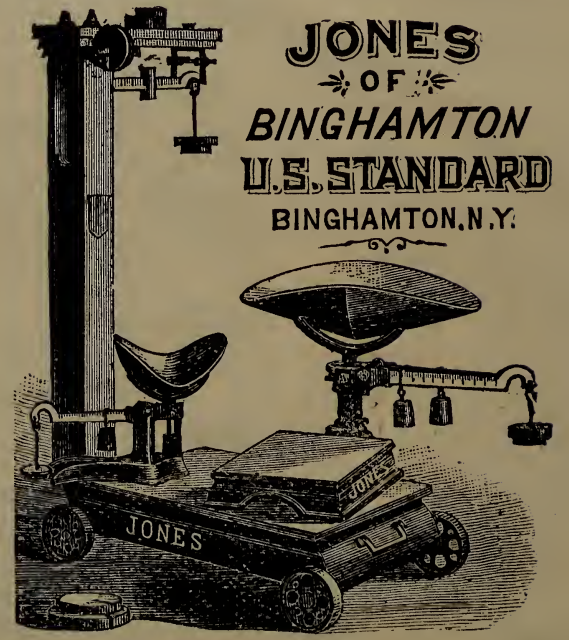
OFFICE AND WORKS:

N. E. Cor. 36th and Filbert Sts.,

PHILADELPHIA, PA.

"JONES, HE PAYS THE FREIGHT."

THE BEST AND THE CHEAPEST.



We are devoting especial attention to the demands of the HARDWARE TRADE, and we solicit your application for prices.

JONES OF BINGHAMTON,

BINGHAMTON, N. Y.

WEIGHTS AND MEASURES—Continued.

Square Measure.

ins.		feet.		yards.		perches.		roods.		acre.		Square metres.
1	=	.00694	=	.000772	=	.0000255	=	.00000064	=	.000000159	=	.000645
144	=	1	=	.111	=	.00367	=	.0000918	=	.000023	=	.0929
1296	=	9	=	1	=	.0331	=	.000826	=	.0002062	=	.8361
39204	=	272¼	=	30¼	=	1	=	.025	=	.00625	=	25.292
1568160	=	10890	=	1210	=	40	=	1	=	.25	=	1011.7
6272640	=	43560	=	4840	=	160	=	4	=	1	=	4046.7

100 square feet = 1 square.
1 chain wide = 8 acres per mile.
10 square chains = 1 acre.
1 hectare = 2.471143 acres.
1 square mile. = 27878400 sq. feet. = 3097600 sq. yds. = 640 acres.
Acres x .0015625 = square miles.
Sq. yds. x .000000323 = sq. miles.

A section of land is 1 mile square, and contains 640 acres
A square acre is 208.71 feet at each side.
" ½ " 147.58 " "
" ¼ " 104.355 " "
A circular " 235.504 feet in diameter.
" ½ " 166.527 " "
" ¼ " 117.752 " "

52 1-6	feet	square,	or.....	2,722½	square	feet	is	1-16	acre.
73¾	feet	square,	or.....	5,445	square	"	is	⅛	acre.
104⅓	feet	square,	or.....	10,890	square			¼	acre.
120¼	feet	square,	or.....	14,520	square			⅓	acre,
147⅝	feet	square,	or.....	21,780	square	f			acre.
208⅔	feet	square,	or.....	43,560	square	feet			acre.

Cubic Measure.

ins.		feet.		yard.		cubic metres.
1	=	.0005788	=	.000002144	=	.000016386.
1728	=	1	=	.03704	=	.028315
46656	=	27	=	1	=	.764513

A cord of wood= 128 cubic feet, being 4 feet high, 4 feet wide, and 8 feet long.
42 cubic feet = a ton of shipping.

A CUBIC FOOT IS EQUAL TO

1728 cubic inches.
.037037 cubic yard.
.803564 U. S. struck bushel of 2150.42 cubic inches.
3.21426 U. S. pecks.
7.48052 U. S. liquid galls. of 231 cub. inch.
6.42851 U. S. dry gallons.
29.92208 U. S. liquid quarts.
25.71405 U. S. dry quarts.
59.84416 U. S. liquid pints.
51.42809 U. S. dry pints.
239.37662 U. S. gills.
.26667 flour barrel of 3 struck bushels.
2.2748 U. S. liquid barrel of 31½ gallons.

Dry Measure.

The Standard Bushel contains 2150.42 cubic inches, or 77.627013 pounds avoirdupois of pure water at maximum density. It legal dimensions are 18½ inches Diameter inside, 19¼ inches outside, and 8 inches deep; and when heaped, the cone must be 6 inches high, making a heaped bushel equal to 1¼ struck ones.

Pints.		Quarts.		Gallons.		Pecks.		Bushels.		Cubic Inches.
2	=	1	=	.250	=	.125	=	.0315	=	67.2
8	=	4	=	1	=	.5	=	.125	=	268.8
16	=	8	=	2	=	1	=	.25	=	537.6
64	=	32	=	8	=	4	=	1	=	2150.42

Liquid Measure.

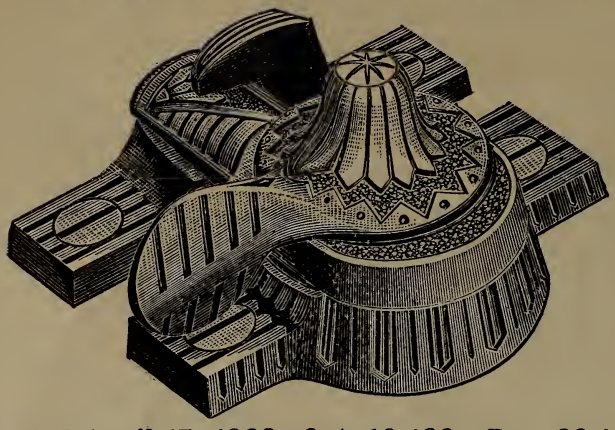
The standard gallon measures 231 cubic inches, or 8.33888 lbs., avoirdupois of pure water, at about 39.85 degrees Fahr., the barometer at 30 inches.

gills.										
4	=	1 pint.								
8	=	2	=	1 quart.						
32	=	8	=	4	=	1 gallon.				
1344	=	336	=	168	=	42	=	1 tierce.		
2016	=	504	=	252	=	63	=	1½	=	1 hogshead.
2688	=	672	=	336	=	84	=	2	=	1⅓ = 1 puncheon.
4032	=	1008	=	504	=	126	=	3	=	2 = 1½ = 1 pipe.
8064	=	2016	=	1008	=	252	=	6	=	4 = 3 = 2 = 1 tun.

A cubic foot contains 7½ gallons.

IVES' PATENT SASH LOCKS.

WARRANTED BURGLAR-PROOF.



A very important feature of the IVES SASH LOCK is in its securely locking when closed, and simultaneously drawing the meeting rails closely together. All the movements are accomplished by cams without the instrumentality of springs, thus avoiding the possibility of getting out of order.

IVES' PATENT SASH LOCKS and OR BOLTS are for sale by all DEALERS IN HARDWARE.

Patented April 17, 1883; Oct. 16, '83; Dec. 30, '84; March 24, '85; May 12, '85; June 23, '85; Patented in Canada March 24, 1886.

HOBART B. IVES & CO.,

SOLE MANUFACTURERS AND PATENTEES,

Send for Illustrated Price-Lists. - - *NEW HAVEN, CONN.*

"SUCCESS"

Sweat Collars

POSITIVELY PREVENT COLLAR GALLS AND SORE SHOULDERS.

OVER 2,000,000 HAVE BEEN SOLD IN THE PAST FOUR YEARS.

It requires no tying or sewing to the Collar.
It is always ready for use, and can be used on any collar.
It is one of the biggest paying articles in the country to handle.
For sale by the jobbing trade in general.
For information and catalogue, address

E. L. McCLAIN MANUFACTURING CO., Cincinnati, Ohio.

☞Please Mention this Book.

THE METRIC SYSTEM.

WEIGHTS.

Metric Denominations and values. Names.	No. Grams.	Equivalents in Denominations in use. Weight of what quantity of water at maximum density.	Avoirdupois Weight.
Millier or tonneau	= 1,000,000	= 1 cubic meter	= 2204.6 pounds
Quintal	= 100,000	= 1 hectoliter	= 220.46 pounds
Myriagram	= 10,000	= 10 liters	= 22.046 pounds
Kilogram or kilo	= 1,000	= 1 liter	= 2.2046 pounds
Hectogram	= 100	= 1 deciliter	= 3.5274 ounces.
Dekagram	= 10	= 10 c centimeter	= 0.3527 ounce.
Gram	= 1	= 1 c. centimeter	= 15.433 grains.
Decigram	= .1	= .1 c. centimeter	= 1 5432 grains.
Centigram	= .01	= 10 c. millimeter	= 0.1543 grain.
Milligram	= .001	= 1 c. millimeter	= 0.0154 grain.

MEASURES OF LENGTH.

Metric Denominations and Values.		Equivalents in Denominations in use.
Myriameter =	10,000 meters	= 6.2137 miles.
Kilometer =	1,000 meters	= 0.62137 m. or 3,280 feet 10 inches.
Hectometer =	100 meters	= 328 feet and 1 inch.
Dekameter =	10 meters	= 393.7 inches.
Meter =	1 meter	= 39.37 inches.
Decimeter =	.1 of a meter	= 3.937 inches.
Centimeter =	.01 of a meter	= 0.3937 inch.
Millimeter =	.001 of a meter	= 0.0394 inch.

MEASURES OF SURFACE.

Metric Denominations and Values.		Equivalents in Denomination in use.
Hectare =	10,000 square meters	= 2 471 acres.
Are =	100 square meters	= 119.6 square yards.
Centare =	1 square meter	= 1.550 square inches.

MEASURES OF CAPACITY.

Metric Denominations and Values. Names.	No. Liters.	Cubic Measure.	Equivalents in Denominations in use. Dry Measure.	Wine Measure.
Kiloliter =	1,000 =	1 cubic meter =	1.308 cubic yards =	264.17 gallons.
Hectoliter =	100 =	.1 cubit meter =	2 bush. 3.35 pks. =	26.417 gallons.
Decaliter =	10 =	10 c. decimeters =	9.08 quarts =	2.6417 gallons.
Liter =	1 =	1 c. decimeter =	0.908 quart =	1.0567 quarts.
Deciliter =	.1 =	.1 c. decimeter =	6.1022 cubic inch. =	0 845 gill.
Centiliter =	.01 =	10 c.centimeters =	0.6102 cubic inch. =	0.338 fluid oz.
Milliliter =	.001 =	1 c. centimeter =	0.061 cubic inches =	0.27 fluid dr.

SEYMOUR'S SHEARS

The Best Made. Every Pair Warranted.

Maroon and Black Japanned Handles, or
Nickel-Plated Handles and Blades.

Straight and Bent Trimmers, Tailors' Shears, Bankers' Shears, Ladies' Scissors, Snips, &c.

SOLD BY ALL RELIABLE DEALERS.

Henry Seymour Cutlery Company,

84 AND 86 CHAMBERS ST., N. Y.

CUT NAILS,
SPIKES
CLINCH NAILS,
Boiler and Bridge Rivets,
BOILER BRACE JAWS,
STAY BOLT IRON,
SQUARE AND HEXAGON NUTS,
Washers and Bolts.

FULLER BROTHERS & CO.,

139 GREENWICH ST., - NEW YORK.

Schedule of Extras on Cut Nails.

10d to 60d Common	at Standard or Lowest Price
8d and 9d "	.25 per keg above 10d
6d and 7d "	.50 " " "
4d and 5d "	.75 " " "
3d "	1.50 " " "
3d Fine, 2d and Roofing	2.25 " " "
2d Fine	4.00 " " "
Cut Spikes, all sizes	.25 " " "
Fencing and Sheathing	Same price as same size Common Nails.

	3d	4d&5d	6d	8d	10d and larger.
Coopers', Slating and Tobacco	2.00	1.25	1.00	.75	.50 per keg above 10d common.
Casing, Flooring and Box		1.50	1.25	1.00	.75 " " " "
Finishing		1.75	1.50	1.25	1.00 " " " "
Trunk			1.75		

	2 & 2¼ in.	2½ & 2¾ in.	3 in. & longer.
Clinch	2.00	1.75	1.50 per keg above 10d common
" in half kegs	2.50	2.25	2.00 per 100 lbs. " " "

Number of Nails and Tacks in a Pound.

Nails.			Tacks.		
Title.	Length.	No. in a lb.	Title.	Length.	No. per lb.
3 penny fine	1⅛ inch	760 nails	1 ounce	3-16 inch	16,000
3 " common	1¼ "	480 "	1½ "	7-32 "	10,666
4 " "	1½ "	300 "	2 "	¼ "	8,000
5 " "	1¾ "	200 "	2½ "	5-16 "	6,400
6 " "	2 "	160 "	3 "	⅜ "	5,332
7 " "	2¼ "	128 "	4 "	7-16 "	4,000
8 " "	2½ "	93 "	6 "	8-16 "	2,666
9 " "	2¾ "	72 "	8 "	9-16 "	2,000
10 " "	3 "	60 "	10 "	10-16 "	1,600
12 " "	3¼ "	44 "	12 "	11-16 "	1,332
16 " "	3½ "	32 "	14 "	12-16 "	1,143
20 " "	4 "	24 "	16 "	13-16 "	1,000
30 " "	4½ "	18 "	18 "	14-16 "	888
40 " "	5 "	14 "	20 "	15-16 "	800
50 " "	5½ "	12 "	22 "	1 "	727
60 " "	6 "	10 "	24 "	1⅛ "	666
6 fence	2 "	80 "			
8 " "	2½ "	50 "			
10 " "	3 "	34 "			
12 " "	3¼ "	29 "			

No. of Cut Spikes in Keg of 100 Pounds.

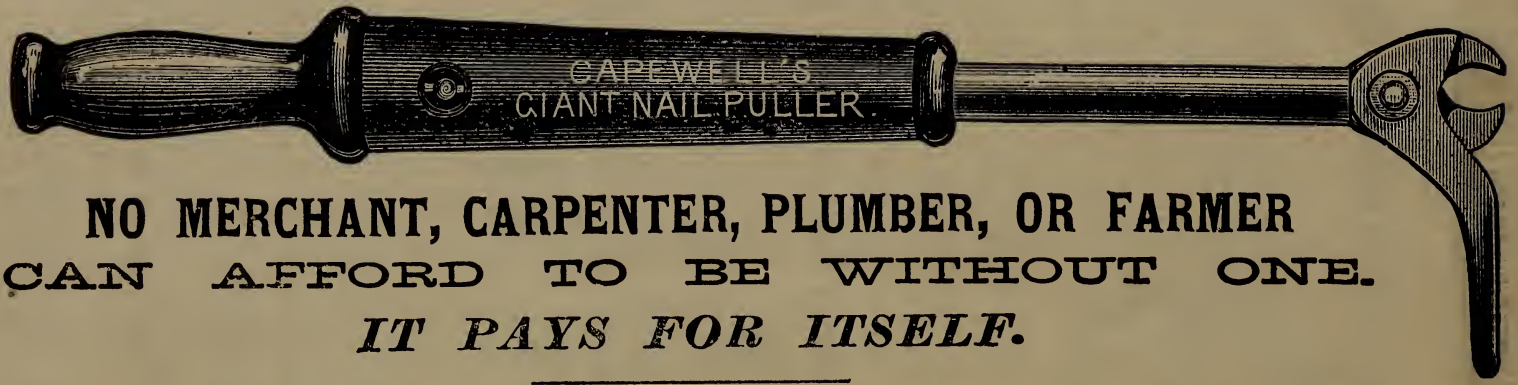
3 inch.....2,900	5 inch..... 950	6½ inches..... 575
3½ " 2,100	5½ " 850	7 " 450
4 " 1,500	6 " 775	8 " 375
4½ " 1,150		

AWARDED A DIPLOMA BY THE AMERICAN INSTITUTE, NEW YORK.

AWARDED A BRONZE MEDAL BY THE SYDNEY EXPOSITION, AUSTRALIA.

IT SAVES MONEY, TIME, LABOR AND NAILS.

THE GIANT NAIL-PULLER AND BOX-OPENER.



NO MERCHANT, CARPENTER, PLUMBER, OR FARMER
CAN AFFORD TO BE WITHOUT ONE.
IT PAYS FOR ITSELF.

ASK ANY ONE OF THE THOUSANDS WHO USE THEM.

MANUFACTURED BY

MALTBY, HENLEY & CO.,

FOR SALE BY

ALL HARDWARE DEALERS

July 8, 1886.

STEEL WIRE NAILS.

Standard Price List.

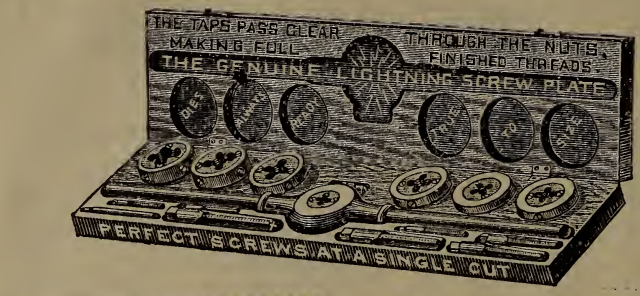
Size.	Length of Nail.	Add to the price of 10d Com. Standard.
Common, Fence, Flooring Brads, Shingle and Tobacco Nails.		
10d-60d.	3 in. to 6 in.	Rate
8d & 9d.	2½ in. & 2¾ in.	$ 35
6d & 7d.	2 in. & 2¼ in.	75
4d & 5d.	1½ in. & 1¾ in.	1 10
3d.	1¼ inch.	2 25
2d.	1 inch.	3 75
Barbed Common.		
10d-60d.	3 in. to 6 in.	40
8d & 9d.	2½ in. & 2¾ in.	75
6d & 7d.	2 in. & 2¼ in.	1 00
4d & 5d.	1½ in. & 1¾ in.	1 50
3d.	1¼ inch.	2 50
2d.	1 inch.	4 00
Casing and Smooth Box.		
10d-40d.	3 in. to 5 in.	75
8d & 9d.	2½ in. & 2¾ in.	1 25
6d & 7d.	2 in. & 2¼ in.	1 50
4d & 5d.	1½ in. & 1¾ in.	2 00
3d.	1¼ inch.	3 00
2d.	1 inch.	4 00
Barbed Box, 25c. add to Smooth.		
Smooth Finishing Nails.		
2d.	1 inch.	5 00
3d.	1¼ inch.	4 00
4d & 5d.	1½ in. & 1¾ in.	2 75
6d & 7d.	2 in. & 2¼ in.	2 00
8d & 9d.	2½ in. & 2¾ in.	1 50
10d-20d.	3 in. to 4 in.	1 25
For Barbed, 25c. add to Smooth.		
Fine Nails.		
2d.	1 inch.	4 50
3d.	1⅛ inch.	3 75
4d.	1½ inch.	2 75
Lining Nails.		
	¾ inch.	6 00
	⅞ inch.	5 00
	1 inch.	4 50

Size.	Length of Nail.	Add to the price of 10d Com. Standard.
Barrel Nails.		
	¾ inch.	$5 00
	⅞ inch.	4 50
	1 inch.	3 75
	1⅛ inch.	2 60
	1¼ inch.	2 25
	1⅜ inch.	1 50
	1½ inch.	1 10
Slating Nails.		
2d.	inch.	3 00
3d.	1¼ inch.	2 00
4d.	1½ inch.	1 50
5d.	1¾ inch.	1 25
Barbed Roofing Nails.		
	¾ inch.	4 50
	⅞ inch.	3 50
2d.	1 inch.	3 00
3d.	1¼ inch.	2 25
4d.	1½ inch.	1 75
5d.	1¾ inch.	1 50
6d.	2 inch.	1 25
Barbed Oval-Head Car Nails, Light and Heavy.		
4d.	1½ inch.	1 75
5d.	1¾ inch.	1 50
6d & 7d.	2 in. & 2¼ in.	1 25
8d & 9d.	2½ in. & 2¾ in	1 00
10d-60d.	3 in. to 6 in.	75
Clinch Nails.		
2d.	1 inch.	3 50
3d.	1¼ inch.	2 75
4d & 5d.	1½ in. & 1¾ in	2 00
6d-20d.	2 in. to 4 in.	1 75
Wire Spikes.		
All sizes.	3 in. to 9 in.	35

WILEY & RUSSELL MFG. CO.,

GREENFIELD, MASS.

PATENT SCREW-CUTTING AND OTHER LABOR-SAVING TOOLS.



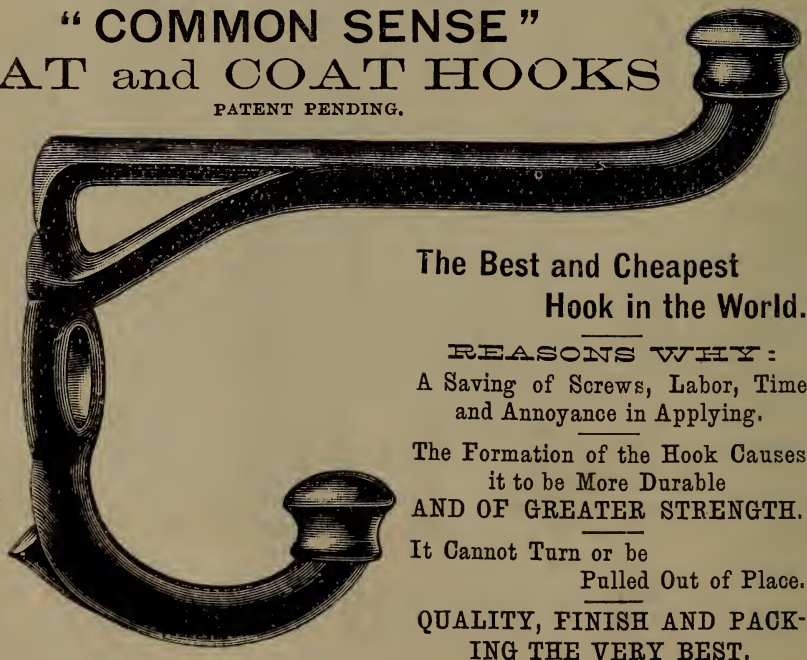
SEND FOR COMPLETE LIST.

CHERITON'S

"COMMON SENSE"

HAT and COAT HOOKS

PATENT PENDING.



Full Size Cut, Nos. 66 and 166.

The Best and Cheapest Hook in the World.

REASONS WHY:

A Saving of Screws, Labor, Time and Annoyance in Applying.

The Formation of the Hook Causes it to be More Durable AND OF GREATER STRENGTH.

It Cannot Turn or be Pulled Out of Place.

QUALITY, FINISH AND PACKING THE VERY BEST.

APPROXIMATE NUMBER OF WIRE NAILS PER POUND.

WIRE GAUGE.	DIAM. W. & M.	APPROXIMATE SIZE.	3/16	1/4	3/8	1/2	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3	3 1/2	4	4 1/2	5	6	7	8
	Inches.	*Inches.*																								
00	.331	11/32 scant.	.....	.....	.....	.....	.....	.....	.....	.....	.....	33	27	23	20	18	16	15	14	12	10	9	8	7	6	5
0	.307	5/16 full.	.....	.....	.....	.....	.....	.....	.....	.....	.....	34	29	25	21	19	17	16	15	13	11	10	9	8	7	5 1/2
1	.283	9/32 scant.	.....	.....	.....	.....	.....	.....	.....	57	50	45	38	32	28	25	23	21	19	16	14	13	11	10	8	7
2	.263	1/4 full.	.....	.....	.....	.....	.....	.....	.....	65	58	52	44	37	32	29	26	24	22	19	16	14	13	11	9	8
3	.244	1/4 scant.	.....	.....	.....	.....	.....	100	87	76	67	60	50	43	38	34	30	28	25	22	19	17	15	13	11	10
4	.225	7/32 full.	.....	.....	.....	.....	.....	120	103	90	80	72	60	51	45	40	36	33	30	26	23	20	18	15	13	11
5	.207	1/8	.....	.....	.....	211	169	141	121	106	94	85	71	60	53	47	42	39	35	30	26	24	21	18	15	..
6	.192	3/16 full.	.....	.....	.....	247	197	164	141	123	111	99	82	71	62	55	50	45	41	35	31	28	25	21	18	..
7	.177	1/6	.....	.....	.....	299	239	200	171	149	133	120	100	85	75	67	60	54	50	43	37	33	30	25	..	..
8	.162	5/32 full.	.....	.....	.....	345	275	229	197	172	153	137	115	98	86	76	69	62	57	49	43	39	35	29	..	..
9	.148	1/7	.....	.....	.....	414	331	276	236	207	184	165	138	118	103	92	82	75	69	59	52	46	41	..	..	..
10	.135	1/8 full.	.....	.....	663	496	397	333	283	248	220	198	165	142	124	110	99	90	83	71	62	55	50	..	..	..
11	.120	1/8 scant.	.....	.....	837	628	502	418	359	314	279	251	209	179	157	139	125	114	105	90	79	70	..	..	..	..
12	.105	1/10	.....	.....	1.096	822	658	548	469	411	365	329	274	235	205	182	164	149	137	117	103	..	..	..	..	..
13	.092	3/32	.....	.....	1.429	1.072	857	714	613	536	476	429	357	306	268	238	214	195	178	153	...	..	..	..	..	..
14	.080	1/12	.....	2.840	1.893	1.420	1.136	947	811	710	631	568	473	406	350	315	284	258	236	..	...	..	..	..	..	..
15	.072	1/14	.....	3.504	2.336	1.752	1.402	1.168	1.001	876	778	701	584	500	438	389	350	...	..	..	...	..	..	..	..	..
16	.063	1/16	.....	4.571	3.048	2.282	1.828	1.523	1.305	1.143	1.015	913	761	653	571	508	...	...	...	...	...	..	..	..	..	..
17	.054		.....	6.233	4.156	3.116	2.495	2.077	1.781	1.558	1.385	1.246	1.038	890	779	...	...	...	...	...	...	..	..	..	..	..
18	.047		.....	8.276	5.517	4.138	3.310	2.758	2.364	2.069	1.839	1.655	1.379	1.182	...	...	...	...	...	...	...	..	..	..	..	..
19	.041		.....	10.668	7.612	5.334	4.267	3.556	2.933	2.667	2.370	2.133	1.778	.....	...	...	...	...	...	...	...	..	..	..	..	..
20	.035	1/32 full.	20.000	15.000	10.000	7.500	6.000	5.000	4.400	2.750	3.333	3.000	.....	.....	...	...	...	...	...	...	...	..	..	..	..	..
21			23.702	17.777	11.850	8.888	7.111	5.926	5.079	4.444	.....	.....	.....	.....	...	...	...	...	...	...	...	..	..	..	..	..
22			30.476	22.856	15.227	11.428	9.143	7.618	.....	.....	.....	.....	.....	.....	...	...	...	...	...	...	...	..	..	..	..	..

This Table is an *Average* only, and the figures given may be varied slightly either way, by changes in the dimensions of the heads or points.

HARTMAN STEEL CO. Ld.

OFFICE and WORKS,

BEAVER FALLS, - PA.

Western Office and Warehouse,

72 WEST LAKE ST., Chicago, Ill.

MANUFACTURERS OF

OPEN HEARTH AND BESSEMER

STEELS

OF EVERY DESCRIPTION.

MARKET WIRE, FENCE WIRE,

HAY BALE TIES.

STEEL WIRE NAILS,

—AND—

CAST STEEL WIRE BRADS.

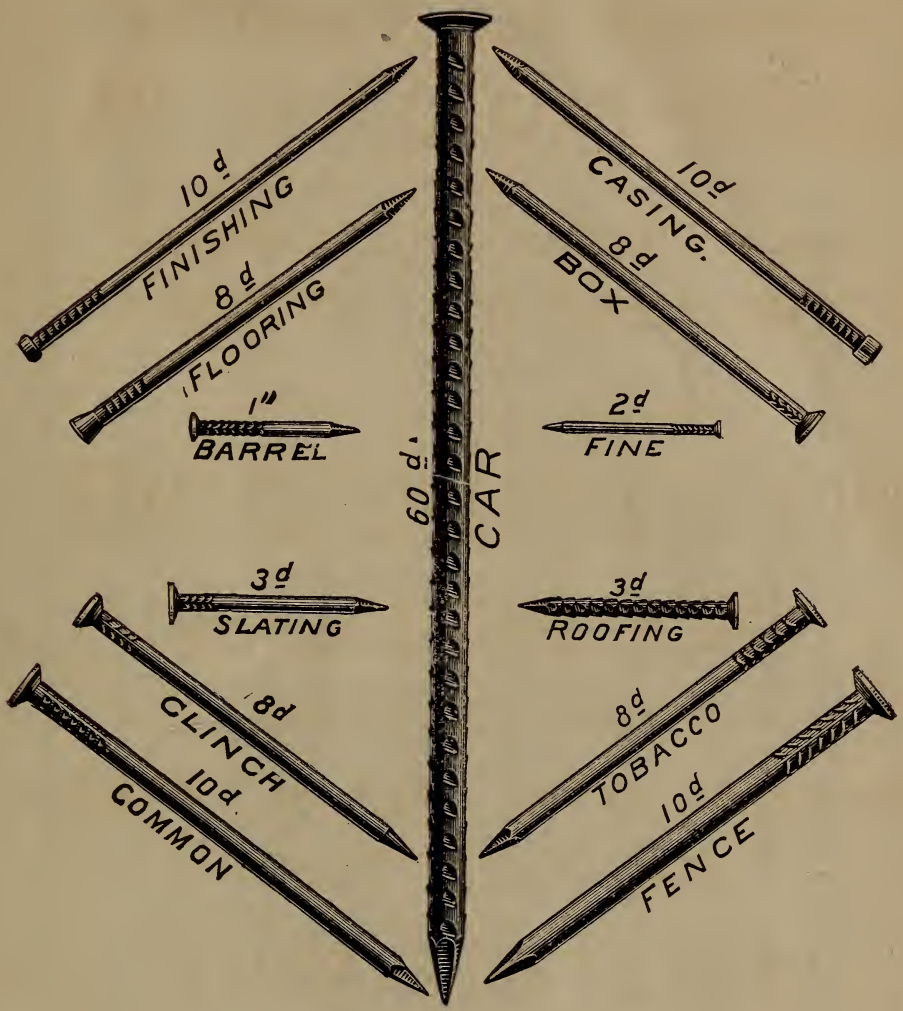
The Originators and Largest Manufacturers of

STANDARD WIRE NAILS,

to replace "Common Cut."

See opposite page, for Sample Card.

SAMPLE STYLES OF WIRE NAILS.



THE PUBLISHERS having made every effort to make this Book an acceptable gift to the Dealer to whom it is sent, would be pleased to receive in reply a Postal Card acknowledgment of its having safely arrived.

STANDARD STEEL WIRE NAILS.

SIZES, LENGTH AND NUMBER TO THE POUND.

SIZES.	Length.	Common.	Barbed Common.	Clinch.	Fence.	Finishing	Barbed Finishing	Fine.	Barrel.	Casing.	Smooth Box.	Barbed Box.	Flooring Brads.	Barbed Oval-Head Car Nail. Light.	Barbed Oval-Head Car Nail. Heavy.	Slating.	Barbed Roofing.	Shingle.	Tobacco.	Lining.	Wire Spikes.	Length.	SIZES.
	¾ in	....	...	....	....	....	....	.. .	1500	....	...	....	...	.....	.....	....	714	....	....	2100	....	¾ in	
	⅞ "	....	....	....	....	....	....	....	1000	....	....	...	...	.....	.....	....	469	....	....	1780	....	⅞ "	
2d.....	1 "	1200	876	710	. ..	1658	1558	1550	875	1350	1350	1143	....	.....	.....	411	411	....	....	1500	....	1 "	2d
3d Fine	1⅛ "	....	....	....	....	....	....	1140	775	....	....	....	....	.....	.....	....	...	....	....	...	....	1⅛ "	3d Fine
3d Com	1¼ "	720	568	429	....	980	913	....	560	913	913	885	....	.....	... .	329	251	....	....	....	....	1¼ "	3d Com.
	1⅜ "	....	...	....	....	....	....	....	390	....	....	....	..	.....	.....	....	....	....	....	..	....	1⅜ "	
4d.....	1½ "	432	357	274	....	760	584	760	350	584	584	530	....	274	165	209	165	....	274	....	....	1½ "	.....4d
5d.....	1¾ "	300	235	235	142	575	410	....	....	410	410	406	....	142	118	142	142	270	235	....	....	1¾ "	.....5d
6d.....	2 "	252	204	157	124	350	268	...	....	310	310	299	157	124	103	....	103	204	157	....	....	2 "	.....6d
7d.....	2¼ "	186	139	139	92	275	238	....	....	238	238	210	139	92	76	....	....	182	139	....	....	2¼ "	.....7d
8d.....	2½ "	132	99	99	82	190	164	....	....	170	170	170	99	82	69	....	....	125	99	...	....	2½ "	.....8d
9d.....	2¾ "	105	90	90	62	173	149	. ..	....	150	150	147	90	62	54	....	....	114	90	...	....	2¾ "	.....9d
10d.....	3 "	87	69	83	50	137	105	....	.. .	121	121	121	69	57	50	....	....	83	69	....	50	3 "	.... 10d
12d....	3¼ "	66	53	64	38	98	97	....	....	97	97	94	53	47	38	....	....	....	....	....	....	3¼ "	.... 12d
16d.....	3½ "	51	43	59	30	81	71	....	....	72	72	72	43	43	35	....	....	....	....	....	35	3½ "	.... 16d
20d.....	4 "	35	31	43	23	71	54	....	....	54	54	53	....	31	26	....	....	....	....	....	26	4 "	.... 20d
30d.....	4½ "	27	24	....	....	....	....	....	....	46	46	44	....	28	24	....	....	....	....	....	20	4½ "	.... 30d
40d.....	5 "	21	18	....	....	....	....	....	....	36	36	36	....	21	18	....	....	....	....	....	15	5 "	.... 40d
50d.....	5½ "	15	....	....	....	....	....	....	....	.. .	....	....	....	17	14	....	....	....	....	....	12	5½ "	.... 50d
60d.....	6 "	12	....	....	....	....	....	....	....	....	....	....	....	15	13	....	....	....	....	....	10	6 "	.... 60d
	6½ "																				9	6½ "	
	7 "																				7	7 "	
	8 "																				5	8 "	
	9 "																				4½	9 "	

3⅜ lbs. of 4d Common, or 2⅜ lbs. of 3d Common, will lay 1000 shingles.

3¾ lbs. of 3d Fine will put on 1000 laths, 4 nails to the lath.

DIFFERENT STANDARDS FOR WIRE GAUGE IN USE IN THE UNITED STATES.

Dimensions of Sizes, in Decimal Parts of an Inch.

Number of Wire Gauge.	American, or Brown & Sharpe.	Birmingham, or Stubs's.	Washb'n & Moen Mfg. Co., Worcester, Mass.	Trenton Iron Co., Trenton, N. J.	G. W. Prentiss, Holyoke, Mass.	Old English from Brass Mfrs'. List.	Number of Wire Gauge.
000000	.....	....	.46	....	....	....	000000
00000	.....	...	.43	.45		....	00000
0000	.46	.454	.393	.4	....	....	0000
000	.40964	.425	.362	.36	.3586	....	000
00	.3648	.38	.331	.33	.3282	....	00
0	.32495	.34	.307	.305	.2994	....	0
1	.2893	.3	.283	.285	.2777	....	1
2	.25763	.284	.263	.265	.2591	....	2
3	.22942	.259	.244	.245	.2401	...	3
4	.20431	.238	.225	.225	.223	....	4
5	.18194	.22	.207	.205	.2047	....	5
6	.16202	.203	.192	.19	.1885	....	6
7	.14428	.18	.177	.175	.1758	....	7
8	.12849	.165	.162	.16	.1605	....	8
9	.11443	.148	.148	.145	.1471	....	9
10	.10189	.134	.135	.13	.1351	....	10
11	.090742	.12	.12	.1175	.1205	....	11
12	.080808	.109	.105	.105	1065	....	12
13	.071961	.095	.092	.0925	.0928	....	13
14	.064084	.083	.08	.08	.0816	.083	14
15	.057068	.072	.072	.07	.0726	.072	15
16	.05082	.065	.063	.061	.0627	.065	16
17	.045257	.058	.054	.0525	.0546	.058	17
18	.040303	.049	.047	.045	.0478	.049	18
19	.03589	.042	.041	.04	.0411	.04	19
20	.031961	.035	.035	.035	.0351	.035	20
21	.028462	.032	.032	.031	.0321	.0315	21
22	.025347	.028	.028	.028	.029	.0295	22
23	.022571	.025	.025	.025	.0261	.027	23
24	.0201	.022	.023	.0225	.0231	.025	24
25	.0179	.02	.02	.02	.0212	.023	25
26	.01594	.018	.018	.018	.0194	.0205	26
27	.014195	.016	.017	.017	.0182	.01875	27
28	.012641	.014	.016	.016	.017	.0165	28
29	.011257	.013	.015	.015	.0163	.0155	29
30	.010025	.012	.014	.014	.0156	.01375	30
31	.008928	.01	.0135	.013	.0146	.01225	31
32	.00795	.009	.013	.012	.0136	.01125	32
33	.00708	.008	.011	.011	.013	.01025	33
34	.006304	.007	.01	.01	.0118	.0095	34
35	.005614	.005	.0095	.0095	.0109	.009	35
36	.005	.004	.009	.009	.01	.0075	36
37	.004453	....	.0085	.0085	.0095	.0065	37
38	.003965	....	.008	.008	.009	.00575	38
39	.003531	....	.0075	.0075	.0083	.005	39
40	.003144	....	.007	.007	.0078	.0045	40

MONTGOMERY & CO.

IMPORTERS OF

Stubs' Files, Tools and Steel,

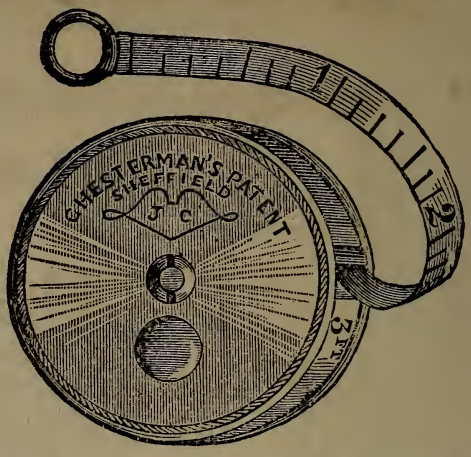
GROBET SWISS FILES,

Chesterman's Measures,

HUBERT'S FRENCH EMERY PAPER,
HORSE SHOE MAGNETS, ETC.

W. SMITH & SON'S
Celebrated Music Wire.

French Sheet Steel 3¼ in. Wide
from 4 to 65 Thousandths.



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FOR PLUMBING AND MECHANICAL USE.

633 and 635 Van Buren St., - Brooklyn, N. Y.

FROM BROWN & SHARPE.

TABLE OF DECIMAL EQUIVALENTS,

of 8ths, 16ths, 32nds and 64ths of an Inch.

FOR USE IN CONNECTION WITH

MICROMETER CALIPER.

8ths.	32nds.	64ths.	64ths.
$\frac{1}{8}$=.125	$\frac{1}{32}$=.03125	$\frac{1}{64}$=.015625	$\frac{33}{64}$=.515625
$\frac{1}{4}$=.250	$\frac{3}{32}$=.09375	$\frac{3}{64}$=.046875	$\frac{35}{64}$=.546875
$\frac{3}{8}$=.375	$\frac{5}{32}$=.15625	$\frac{5}{64}$=.078125	$\frac{37}{64}$=.578125
$\frac{1}{2}$=.500	$\frac{7}{32}$=.21875	$\frac{7}{64}$=.109375	$\frac{39}{64}$=.609375
$\frac{5}{8}$=.625	$\frac{9}{32}$=.28125	$\frac{9}{64}$=.140625	$\frac{41}{64}$=.640625
$\frac{3}{4}$=.750	$\frac{11}{32}$=.34375	$\frac{11}{64}$=.171875	$\frac{43}{64}$=.671875
$\frac{7}{8}$=.875	$\frac{13}{32}$=.40625	$\frac{13}{64}$=.203125	$\frac{45}{64}$=.703125
16ths.	$\frac{15}{32}$=.46875	$\frac{15}{64}$=.234375	$\frac{47}{64}$=.734375
$\frac{1}{16}$=.0625	$\frac{17}{32}$=.53125	$\frac{17}{64}$=.265625	$\frac{49}{64}$=.765625
$\frac{3}{16}$=.1875	$\frac{19}{32}$=.59375	$\frac{19}{64}$=.296875	$\frac{51}{64}$=.796875
$\frac{5}{16}$=.3125	$\frac{21}{32}$=.65625	$\frac{21}{64}$=.328125	$\frac{53}{64}$=.828125
$\frac{7}{16}$=.4375	$\frac{23}{32}$=.71875	$\frac{23}{64}$=.359375	$\frac{55}{64}$=.859375
$\frac{9}{16}$=.5625	$\frac{25}{32}$=.78125	$\frac{25}{64}$=.390625	$\frac{57}{64}$=.890625
$\frac{11}{16}$=.6875	$\frac{27}{32}$=.84375	$\frac{27}{64}$=.421875	$\frac{59}{64}$=.921875
$\frac{13}{16}$=.8125	$\frac{29}{32}$=.90625	$\frac{29}{64}$=.453125	$\frac{61}{64}$=.953125
$\frac{15}{16}$=.9375	$\frac{31}{32}$=.96875	$\frac{31}{64}$=.484375	$\frac{63}{64}$=.984375

TABLE OF DECIMAL EQUIVALENTS

OF MILLIMETERS AND FRACTIONS OF MILLIMETERS,

FOR USE IN CONNECTION WITH

METRIC MICROMETER CALIPER.

mm.	Inches.	mm.	Inches.	mm.	Inches.	mm.	Inches.
$\frac{1}{50}$	=.00079	$\frac{20}{50}$	=.01575	$\frac{39}{50}$	=.03071	9	= .35433
$\frac{2}{50}$	=.00157	$\frac{21}{50}$	=.01654	$\frac{40}{50}$	=.03150	10	= .39370
$\frac{3}{50}$	=.00236	$\frac{22}{50}$	=.01732	$\frac{41}{50}$	=.03228	11	= .43307
$\frac{4}{50}$	=.00315	$\frac{23}{50}$	=.01811	$\frac{42}{50}$	=.03307	12	= .47244
$\frac{5}{50}$	=.00394	$\frac{24}{50}$	=.01890	$\frac{43}{50}$	=.03386	13	= .51181
$\frac{6}{50}$	=.00472	$\frac{25}{50}$	=.01969	$\frac{44}{50}$	=.03465	14	= .55118
$\frac{7}{50}$	=.00551	$\frac{26}{50}$	=.02047	$\frac{45}{50}$	=.03543	15	= .59055
$\frac{8}{50}$	=.00630	$\frac{27}{50}$	=.02126	$\frac{46}{50}$	=.03622	16	= .62992
$\frac{9}{50}$	=.00709	$\frac{28}{50}$	=.02205	$\frac{47}{50}$	=.03701	17	= .66929
$\frac{10}{50}$	=.00787	$\frac{29}{50}$	=.02283	$\frac{48}{50}$	=.03780	18	= .70866
$\frac{11}{50}$	=.00866	$\frac{30}{50}$	=.02362	$\frac{49}{50}$	=.03858	19	= .74803
$\frac{12}{50}$	=.00945	$\frac{31}{50}$	=.02441	1	=.03937	20	= .78740
$\frac{13}{50}$	=.01024	$\frac{32}{50}$	=.02520	2	=.07874	21	= .82677
$\frac{14}{50}$	=.01102	$\frac{33}{50}$	=.02598	3	=.11811	22	= .86614
$\frac{15}{50}$	=.01181	$\frac{34}{50}$	=.02677	4	=.15748	23	= .90551
$\frac{16}{50}$	=.01260	$\frac{35}{50}$	=.02756	5	=.19685	24	= .94488
$\frac{17}{50}$	=.01339	$\frac{36}{50}$	=.02835	6	=.23622	25	= .98425
$\frac{18}{50}$	=.01417	$\frac{37}{50}$	=.02913	7	=.27559	26	=1.02362
$\frac{19}{50}$	=.01496	$\frac{38}{50}$	=.02992	8	=.31496		

10 mm. = 1 Centimeter = 0.3937 inches.
10 cm. = 1 Decimeter = 3.937 ".
10 dm. = 1 Meter = 39.37 ".
25.4 mm. = 1 English Inch.

TERRY'S "LEADER"

Anti-Friction
STEEL
HANGER.

Best Hanger Made.

Is Unsurpassed for STRENGTH, EASE OF WORKING or SIMPLICITY of CONSTRUCTION. Made of Steel and used on the Popular Terry Steel Rail. A Ready Seller and full of Merit.

Try Them. Write for Discounts.

4-Inch Wheel, 6-foot run, per dozen pairs, - $15 00
5-Inch Wheel, 10-foot run, per dozen pairs, - - 18 00

IF NOT ON SALE BY YOUR JOBBER, WRITE

TERRY MANUFACTURING CO.

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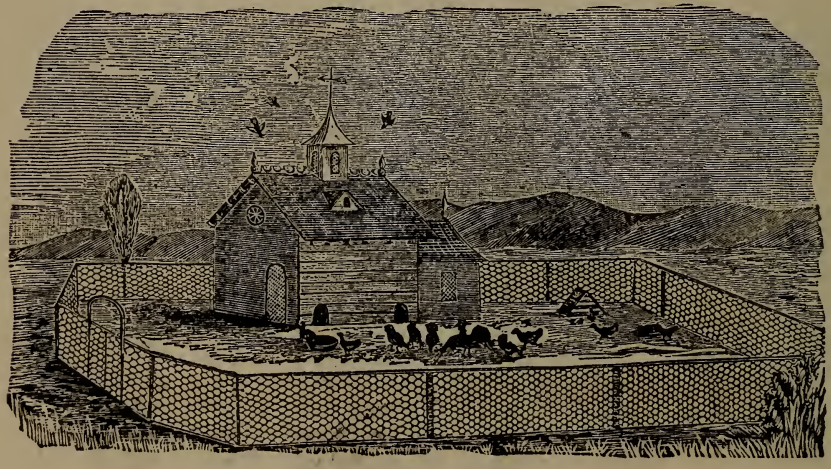
Gilbert & Bennett Mfg. Co.



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Sieves and Wire Cloth, Power Loom Painted and Galvanized Window Screen Wire Cloth, Galvanized Wire Cloth for Drying Fruits, World's Galvanized Web Wire Fence, Galvanized Twist Wire Poultry Netting.

FACTORIES: - - GEORGETOWN, CONN.

Size, Weight, Length and Strength of Iron Wire.

BIRMINGHAM WIRE GAUGE.

Wire Guage.	Diameter.	Weight of 100 Yards.	Weight of 1 mile.	Length of 1 Bundle.	Length of 1 Cwt.	Direct Strain.	
						Area of Section.	Breaking Weight.
No.	Inches.	Lbs.	Lbs.	Yards.	Yards.	Sq. in.	Lbs.
5-0	0 546	161 00	2830	39	70	0 163	13070
4-0	0 425	140 00	2460	45	80	0 142	11350
3-0	0 394	120 00	2113	52	93	0 122	9755
2-0	0 363	102 00	1794	62	110	0 103	8280
0	0 331	84 72	1490	74	132	0 086	6880
1	0 300	68 75	1210	91	162	0 071	5650
2	0 280	59 90	1054	105	187	0 062	4930
3	0 260	51 65	909	121	215	0 053	4250
4	0 240	44 00	775	143	255	0 045	3620
5	0 220	37 00	651	170	303	0 038	3040
6	0 200	30 56	538	203	361	0 031	2510
7	0 185	26 15	461	239	428	0 0265	2220
8	0 170	22 10	389	286	509	0 023	1840
9	0 155	18 36	323	342	609	0 0195	1560
10	0 140	14 97	264	420	747	0 016	1280
11	0 125	11 95	211	529	939	0 0125	1000
12	0 110	9 24	163	700	1244	0 010	800
13	0 095	7 05	124	893	1589	0 0071	568
14	0 085	5 51	97	1142	2031	0 0057	456
15	0 075	4 29	76	1468	2608	0 0044	352
16	0 065	3 22	57	1954	3473	0 0033	264
17	0 057	2 48	44	2540	4515	0 0026	208
18	0 050	1 91	34	3150	5600	0 0020	160
19	0 045	1 55	27	4085	7246	0 0016	128
20	0 040	1 22	21	4912	9168	0 0013	104
21	0 035	0 94	17	6416	11980	0 0010	80
22	0 030	0 69	12	8736	16300	0 0007	56

Sizes Expressed in Fractions of an Inch.

15-32 in.—No. 5-0 full
7-16 in.—No. 4-0 full
13-32 in.—No. 3-0 full
3-8 in.—No. 2-0 full
11-32 in.—No. 0 full
5-16 in.—No. 1 full.
9-32 in.—No. 2
1-4 in.—No. 3½
7-32 in.—No. 5
3-16 in.—No. 7
5-32 in.—No. 9
1-8 in —No. 11
1-10 in —No. 13 full
1-12 in —No. 14
1-16 in.—No. 16
1-32 in.—No. 22

READING HARDWARE CO.,

READING, PA.,

MANUFACTURERS OF

BUILDERS' HARDWARE,

In Real Bronze, Brass and Bronzed Iron,

IN VARIOUS FINISHES KNOWN AS

GENEVA BRONZED, AMERICAN BRONZED,
ALBION BRONZED, COPPER BRONZED,
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Porcelain, Jet, Mineral and Wood

Door and Furniture Knobs.

No Lead or Cement Used in Fastening Shanks and Knobs.

This is the only Knob now on the market that cannot possibly become detached or come off without breaking the knob.

Highly Endorsed and Sold by the Leading Hardware Houses of the United States

COSTS NO MORE THAN ORDINARY KNOBS.

ASK YOUR DEALER FOR IT AND TAKE NO OTHER.

PRICE-LISTS ON APPLICATION.

NEW YORK OFFICE, 121 CHAMBERS STREET.

C. P. LEGGETT Mfg. Co., of N. J.

Use of Wire in Telegraph Service.

No. 4, much used on important lines where the multiplex systems are in use. In the United States in the past few seasons largely replacing smaller sizes.

About 3 per cent. of telegraph wire used in United States is No. 6.

No. 8, medium size for circuits not exceeding 400 miles. Most largely used in United States, now giving way to No. 4.

No. 9 represents about one-half the wire in U. S Telegraph service.

No. 10, shorter circuits, railway telegraph and private lines in United States and Europe.

Nos. 11 and 12, short circuits, police and fire alarms, telephone, etc.

Nos. 14 to 16, short private lines and for telephone service, a low steel being the material.

Use of Large Wire.

Much of the new, and all of the most important line construction of the Western Union Telegraph Company, in the past two or three seasons has called for No. 4 Wire in place of No. 8 and No. 9, as a marked tendency in advanced telegraph service.

"The charge of electricity measured by its potential, resides only on the surface of line wire and its amount is determined by the magnitude and form of the surface. A No. 8 wire has a surface of 228 04 square feet to the mile; a No. 6 wire has 280.37 square feet."

From all the evidence of the best telegraph experts, the larger the wire the greater the strength of the signal that can be transmitted through it to any distance.

Grades of Telegraph Wire.

Iron wire manufactured exclusively for telegraphic service is known in the market in this country and abroad by terms common to the trade as follows:

Extra Best Best (*E. B. B.*) Made by improved continuous processes from the very best iron. It stands highest of any telegraph wire in conductivity, with a weight per mile ohm (*see below*), of from 4600 to 5100 lbs. Very uniform in quality, pure, tough and pliable.

2 *Best Best* (*B. B*) Less uniform and tough than the above-named, but stands a good mechanical test. "Weight per mile ohm." 5500 to 5800 lbs. Is largely used by some telegraph companies and in railway telegraph service.

3 "*Best*" (*B*) A term almost indiscriminately applied to the lower grades of wire designed for electric service. A harder and less pliable wire, "weight per mile ohm," about 6500.

4 "*Steel*" (or Homogeneous metal) more expressly designed for short line Telephone service where a measure of conductivity can be exchanged for tensile strength in a light wire." "Weight per mile ohm," 6000 to 7000 lbs.

Weight per Mile Ohm.

This term is to be understood as distinguishing the *resistance of material* only, and means the weight of such material required per mile to give the resistance of one Ohm. To ascertain the mileage resistance of any wire, divide the "weight per mile ohm" by the weight of the wire per mile. Thus in a grade of Extra Best Best, of which the weight per mile ohm is given at the average of 4860, the mileage resistance of No. 4, (weight per mile 707 lbs) would be about 6 ohms. and No. 14 steel wire 6600 lbs. weight per mile ohm, (89 lbs weight per mil) would show about 75 ohms.

Measuring Weight of Live Cattle.

An allowance of 23 lbs. to the superficial foot is made for cattle that girt from 5 to 7 feet; from 7 to 9 feet, 31 lbs; 16 lbs. for small cattle and calves that girt from 3 to 5 feet, and 11 lbs. to the superficial foot for pigs, sheep, and cattle that girt less than 3 feet. *Rule:* Multiply the girt in inches, back of the shoulder, by the length in inches from the square of the buttock to a point even with the point of the shoulder-blade, and divide by 144 to find the superficial feet: this result multiplied by the number of lbs., allowed as above for cattle of different girts, will give the weight sought.

"Novelty" Dust Pan

A Humane Invention.

Also a Triple Edge.

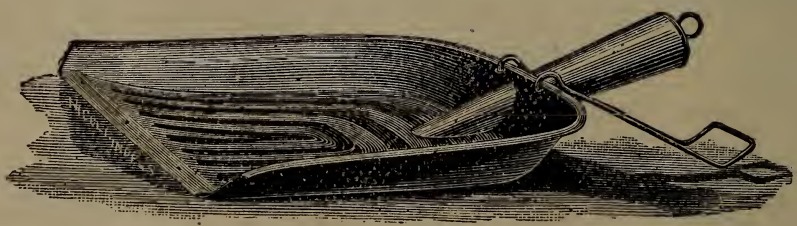
Ain't this a "Daisy"?

MADE OF ONE PIECE.

Neat. Strong, Durable. Cheap.

—TRADE MARK REGISTERED—

Is the recognized STANDARD ELBOW IN THE MARKET.



Write for Prices and Discounts to

LOCK SEAM ELBOW MANUF'G CO.,

SOLE MFRS. INDIANAPOLIS, IND.

Wires of Various Metals Compared.

The following table is given by Mr. David Kirkaldy, of London, to exhibit the tensile strength and resistance to tension of wire made of various materials.

Specimens Tested.	Pulling Stress per square inch	
	Hard. Pounds.	Annealed. Pounds.
Copper	63.122	37.002
Brass	81.156	51 550
Charcoal Iron	65.834	46. 60
Coke Iron	65.321	61.294
Steel	120.976	74.637
Phosphor Bronze, No. 1	159.515	58.853
" " No. 2	151.119	64.569
" " No. 3	120 141	54.111
" " No. 4	120.90[illegible]	53.371

Specimens Tested.	Extension per cent.		No. twists in 5 inches.
	Annealed.	Hard.	Annealed.
Copper	34.1	86.8	96
Brass	36.5	14.7	57
Charco ' Iron	28.	48.	87
Coke Iron	17.	26.	44
Steel	10.9	*	79
Phosphor Bronze, No. 1	46.6	13.3	66
" " No. 2	42.8	15.8	60
" " No. 3	44.9	17.3	53
" " No. 4	42.4	13.	124

Of the eight pieces of steel tested three stood from 40 to 45 twists, and five stood from 1¼ to 4 twists.

Relative Malleability of the Metals.

1. Gold.
2. Silver.
3. Copper.
4. Tin.
5. Platinum.
6. Lead.
7. Zinc.
8. Iron.

Specific Resistances of Metals.

Copper	1.00	Mercury	50.00	Brass Wire	3.88
Silver	.98	Palladium	5.50	German Silver Wire	11.30
Gold	1.13	Platinum	6.78	Nickel Wire	7.70
Iron	5.63	Tin Wire	6.80	Calcium Wire	2.61
Lead	10.76	Zinc Wire	3.70	Aluminium Wire	1.75

List of Conductors and Non-Conductors,

In which each substance named conducts better than that which precedes it; the first being the best insulator, the last the best conductor

1. Dry Air.
2. Paraffine.
3. Hard Rubber.
4. Shellac.
5. India Rubber.
6. Gutta Percha.
7. Sulphur.
8. Glass.
9. Silk.
10. Dry Paper.
11. Porcelain.
12. Dry Wood.
13. Dry Ice.
14. Water.
15. Saline Solutions.
16. Acids.
17. Charcoal or Coke.
18. Mercury.
19. Lead.
20. Tin.
21. Iron.
22. Platinum.
23. Zinc.
24. Gold.
25. Copper.
26. Silver.

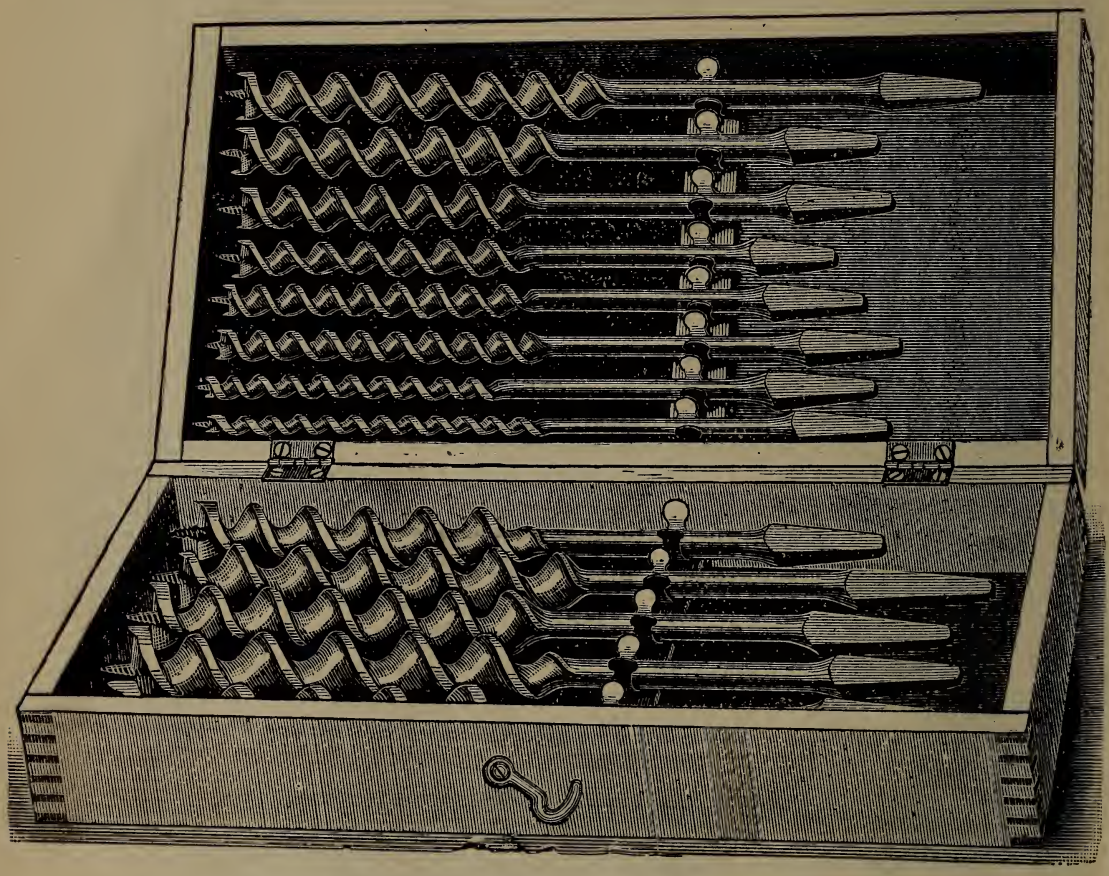
When a wire of small resistance and an insulator of great resistance are employed upon a line the highest excellence is secured, since the lower the resistance in the former the better is the transmission, and the higher the resistance in the latter the less the waste of the current.

C. E. JENNINGS & CO'S

EXTRA QUALITY AUGER BITS.

ALL OUR AUGER BITS ARE MADE OF SOLID CAST STEEL AND WARRANTED.

THIS Illustration represents our Auger Bits put up in Wood Boxes with a rack to hold one Auger Bit of each size. This is a great convenience to Mechanics, as the Bits can be put away immediately after use, each Bit fitting into its own place. These Boxes would cost the Mechanic at least 50 cents without the Bits.



No. 10 set Extension-Lip Pattern, 32½ Quarters, $5.00 per set.

C. E. JENNINGS & CO.,

79 and 81 Reade and 97 Chambers Streets,

NEW YORK.

Table of Iron, Steel, Copper and Brass Wire.

WEIGHT OF 100 FEET IN POUNDS. BIRMINGHAM WIRE GAUGE.

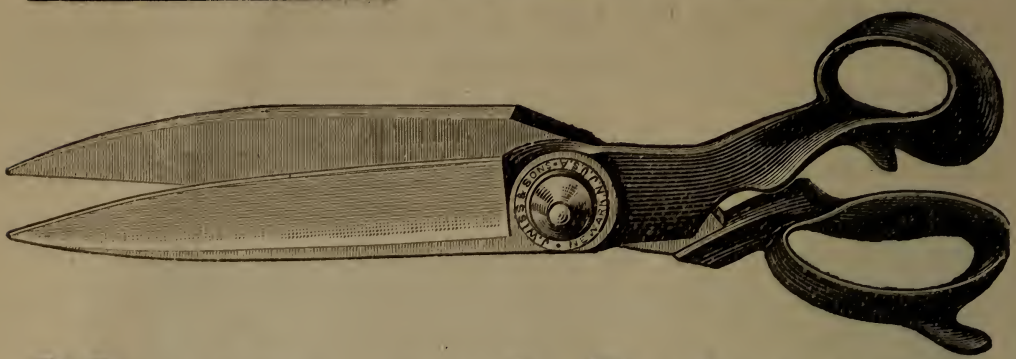
Brass and Copper Wire from 0 to 25 is numbered by Stubs' Gauge. Fine Wire from No. 26 is numbered by London Gauge.

No. of Gauge.	PER LINEAL FOOT.			
	Iron.	Steel.	Copper.	Brass.
0000	54 62	55 13	62 39	58 93
000	47 86	48 32	54 67	51 64
00	38 27	38 63	43 71	41 28
0	30 63	30 92	34 99	33 05
1	23 85	24 07	27 24	25 73
2	21 37	21 57	24 41	23 06
3	17 78	17 94	20 3	19 18
4	15 01	15 15	17 15	16 19
5	12 82	12 95	14 65	13 84
6	10 92	11 02	12 47	11 78
7	8 586	8 667	9 807	9 263
8	7 214	7 283	8 241	7 783
9	5 805	5 859	6 63	6 262
10	4 758	4 803	5 435	5 133
11	3 816	3 852	4 359	4 117
12	3 148	3 178	3 596	3 397
13	2 392	2 414	2 723	2 58
14	1 826	1 843	2 085	1 969
15	1 374	1 387	1 569	1 482
16	1 119	1 13	1 279	1 208
17	8915	9	1 018	9618
18	6363	6423	7168	6864
19	4675	472	534	5043
20	3246	3277	3709	3502
21	2714	274	31	2929
22	2079	2098	2373	2241
23	1656	1672	1892	1788
24	1283	1295	1465	1384
25	106	107	1211	1144
26	0859	0867	0981	0926
27	0678	0685	0775	0732
28	0519	0524	0593	056
29	0448	0452	0511	0483
30	0382	0385	0436	0412
31	0265	0267	0303	0286
32	0215	0217	0245	0231
33	017	0171	0194	0183
34	013	0131	0148	014
35	0066	0067	0076	0071
36	0042	0042	0048	0046

J. WISS & SONS,

Manufacturers of

Only Best Quality Japanned and Nickle-Plated



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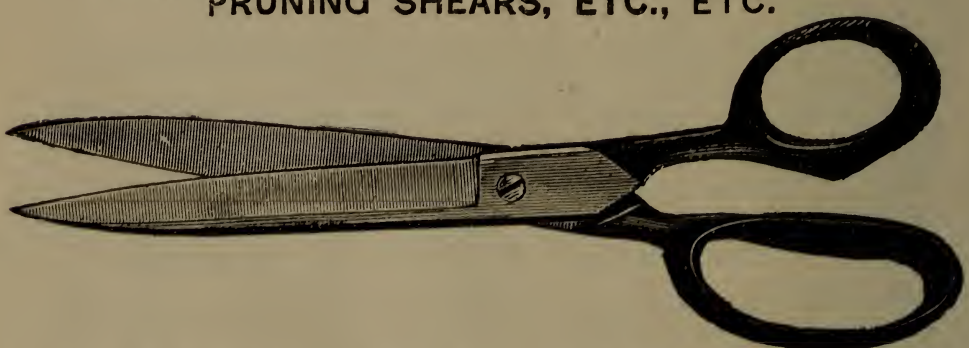
Large Assortment and Full Line of

TAILORS' SHEARS, STRAIGHT AND BENT TRIMMERS, BANKER AND PAPER SHEARS, LADIES' SCISSORS, BARBER SHEARS, TINNERS' SNIPS, PRUNING SHEARS, ETC., ETC.



All Goods Warranted to be of the Very BEST QUALITY and FINISH.

Sold by all the Principal Dealers in the United States.

J. WISS & SONS,

NEWARK, - - - N. J.

Send for Price Lists and Discounts.

TABLE OF WEIGHTS,

Showing Estimated Number of Pounds of Barbed Wire Required to Fence Space or Distances Mentioned, with One, Two or Three Strands.

	1 Strand.	2 Strands.	3 Strands.
1 Square Acre.....	57.5 lbs.	115 lbs.	172 lbs.
1 Side of a Square Acre.	15¼ "	28½ "	42¾ "
1 Square Half-Acre....	40½ "	81 "	121½ "
1 Square Mile.....	1440 "	2880 "	4320 "
1 Side of 1 Square Mile.	360 "	720 "	1080 "
1 Rod in Length.....	1½ "	2¼ "	3⅜ "
100 Rods in Length.....	112½ "	225 "	337½ "
100 Feet in Length.....	7 "	14 "	21 "

When Posts are placed apart.	There are required for each strand of wire, for one mile of fence...			Total cost of 1 mile of fence when posts cost 12½c. each, and wire and staples cost 7¼c. lb. for galvanized.	
Feet.	Posts.	Lbs. of Staples	Lbs. of Wire.	3 Strands.	4 Strands.
8	660	7¼	360	$167 90	$196 35
10	528	5¾	360	149 00	180 39
12	440	4¾	360	139 78	168 07
16½	320	3½	360	124 45	152 68
20	264	3	360	117 40	145 53
25	212	2¼	360	110 74	138 80
30	176	2	360	106 16	134 22
33	160	1¾	360	104 09	132 15

Number of Wires and Distances Between Posts.

Although fences are sometimes made of *two* wires, to fence against cattle only, experts recommend no less than *three*, and as many more as desirable. *Five* wires make a good fence—such is used by nearly all the railroad companies.

The following are the distances apart at which the wires are generally placed:

Two-wire fence, 1st wire 22 inches, 2d wire 44 inches from the ground.

Three-wire fence, 1st wire 16 inches, 2d wire 30 inches, 3d wire 48 inches from the ground.

Four-wire fence, 1st wire 12 inches, 2 l wire 24 inches, 3d wire 36 inches, 4th wire 48 inches from the ground.

Five-wire fence, 1st wire 8 inches, 2d wire 15 inches, 3d wire 24 inches, 4th wire 36 inches, 5th wire 48 inches from the ground.

One less strand may be used with *four-point* than two-point wire.

The Height of the Legal Fence varies as follows:

Four feet high in Maine, New Hampshire, Massachusetts, Delaware and Idaho.

Four and a half feet high in Vermont, Rhode Island, Connecticut, New York, New Jersey, Maryland, West Virginia, Ohio, Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Tennessee, Kansas, Nebraska, Colorado, Oregon, Arizona, Nevada, Montana, Dakota and Utah.

Five feet in Pennsylvania, Virginia, Missouri, Kentucky, North Carolina, South Carolina, Georgia, Alabama, Florida, Mississippi, Texas, Arkansas, California, and Washington and Wyoming Territories.

Furnished by JOHN A. ROEBLING'S SONS CO.,

WIRE STANDARD HOISTING ROPES,

With 19 Wires to the Strand.

TRADE NUMBERS, SIZES, WEIGHT AND STRENGTH.

IRON.

Trade No.	Diameter.	Circumference in inches.	Weight per foot in lbs. of Rope with Hemp Cen	Breaking strain in tons of 2,000 pounds.	Proper working load in tons of 2,000 lbs.	Circumference of Hemp Rope of equal str.	Min. size of drum or sheave in feet.
1..	2¼	6¾	8.00	74	15	15½	8
2..	2	6	6 30	65.	13	14½	7
3 .	1¾	5½	5.25	54.	11	13	6½
4..	1⅝	5..	4.10	44	9	12	5
5..	1½	4¾	3.65	30	8	11½	4¾
5	1⅜	4⅜	3.00	33	6½	10¼	4½
6..	1¼	4	2.50	27	5½	9½	4
7..	1⅛	3½	2.00	20	4	8	3½
8..	1	3⅛	1.58	16	3	7	3
9..	⅞	2¾	1.20	11½	2½	6	2¾
10..	¾	2¼	0.88	8.64	1¾	5	2½
10¼	5/8	2	0.70	5.13	1¼	4½	2
10½	9-16	1⅝	0 44	4.27	¾	4	1¾
10¾	½	1½	0.35	3.48	½	3½	1½

CAST STEEL.

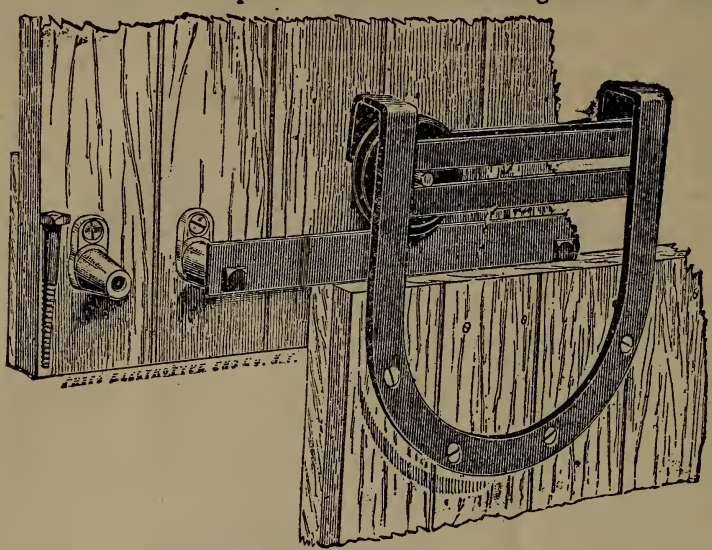
Trade No.	Diameter.	Circumference in inches.	Weight per foot in lbs. of Rope with Hemp Cen	Breaking strain in tons of 2,000 pounds	Proper working load in tons of 2,000 lbs.	Circumference of Hemp Rope of equal str.	Min. size of drum or sheave in feet.
1..	2¼	6¾	8.00	130	26		9
2..	2	6	6.30	100	21		8
3..	1¾	5½	5.25	78	17	15¾	7½
4..	1⅝	5.	4.10	64	13	14½	6
5..	1½	4¾	3.65	55	11	13½	5½
6..	1¼	4	2.50	39	8	11½	5
7..	1⅛	3½	2 00	30	6	10	4½
8..	1	3⅛	1.58	24	5	9¼	4
9..	⅞	2¾	1.20	20	4	8	3¾
10..	¾	2¼	0 88	13	3	6½	3½
10¼	5/8	2	0.70	9	2	5¼	3
10½	9-16	1⅝	0.44	6½	1½	4¾	2¾
10¾	½	1½	0 35	5½	1	4½	2

NOTE.—The weights given are for *Hemp Center Ropes*. The weight of Wire Center Ropes is 10 per cent. more than that for Ropes with Hemp Centers.

For safe working load, allow one-fifth to one-seventh of the ultimate strength, according to speed, so as to get good wear from the rope. When substituting wire rope for hemp rope, it is good economy to allow for the former the same weight per foot which experience has approved for the latter.

LANE'S
PATENT STEEL DOOR HANGER.

The most perfect Anti-Friction Hanger in the Market,



BECAUSE

It is made of steel throughout, except the wheel, which has a steel axle, It will not break It is practically free from wear, It is almost noiseless in action. It requires no oil. It has a broad bearing on the door and keeps in line. It is by far the most durable. It may be used with any track. It is always in order.

LANE'S PATENT TRACK

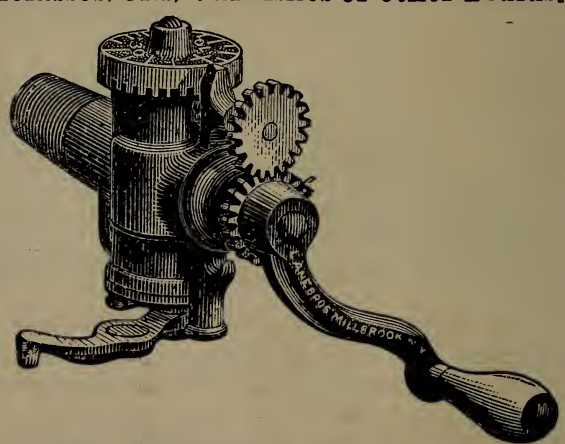
Is made of steel and is easily put in position. Catches and holds no snow or ice. Door hung thereon cannot jump the track. Is not subject to decay. Requires no fitting, but is ready at once. May be used with hangers of other manufacture.

LANE'S MEASURING FAUCET.

PRICE, $3.00.

For Light or Heavy Molasses, Oils, Varnishes or other Fluids.

We warrant these Faucets to to be as represented, measuring correctly and working more easily in heavy molasses than any Measuring Faucet in the market. No grocer can afford to be without them, for they save time, and "time is money." They insure perfect cleanliness, requiring no tin measures or funnel to collect dirt and draw flies. They do not drip. They prevent all waste, as no molasses or other fluid can pass except when the crank is turned. They are the embodiment of simplicity, and consequently they are always in order. They work easily in the heaviest molasses. They are warranted to measure correctly, according to U. S. Standard.



Manufactured Exclusively by

LANE BROS., Poughkeepsie, N. Y.

GENERAL AGENCY,

JOHN H. GRAHAM & CO., 113 Chambers St., New York.

TABLE

SHOWING THE DIAMETER IN DECIMALS OF AN INCH, AND THE NUMBER OF FEET IN ONE POUND OF EACH GAUGE IRON WIRE, AS DRAWN BY THE UNITED STATES MANUFACTURERS.

No.	Decim'ls of inch.	Feet in pound.	No.	Decim'ls of inch.	Feet in pound.
000	.362	2.873	15	.072	72.984
00	.331	3.444	16	.063	95.396
0	.323	3.619	17	.054	129.873
1	.283	4.698	18	.047	172.401
2	.263	5.444	19	.040	222.222
3	.244	6.333	20	.033	301.249
4	.225	7.460	21	.030	370.036
5	.207	8.809	22	.026	476.190
6	.192	10.270	23	.022	640.74
7	.177	12.047	24	.020	879.03
8	.162	14.365	25	.017	1189.71
9	.148	17.238	26	.015	1485.62
10	.135	20.698	27	.014	1872.71
11	.120	26.174	28	.012	2361.42
12	.105	34.254	29	.011	2978.91
13	.092	44.655	30	.010	3754.83
14	.080	59.174			

TABLE

SHOWING CORRESPONDING SIZES OF STUBS' STEEL WIRE OR RODS, TO THE DIVISIONS OF AN INCH.

Nos. 2	12	21	28	30	35	42	48	52	56	61
7-32	3-16	5-32	9-64	1-8	7-64	3-32	5-64	1-16	3-64	1-32

MESH OF COAL SCREENS.

USED BY THE PRINCIPAL COAL DEALERS.

$2\frac{1}{2}$, $2\frac{1}{4}$ and 2 inch	.....	Screens	Furnace Coal.
$1\frac{3}{4}$ and $1\frac{1}{2}$	"	"	Stove out of Egg Coal.
$1\frac{1}{4}$ and 1	"	"	Nut out of Stove "
$\frac{3}{4}$ and $\frac{5}{8}$	"	"	Stove Coal.
$\frac{1}{2}$ and $\frac{3}{8}$	"	"	Nut "
$\frac{1}{4}$	"	"	Pea "
3-16	"	"	Brickmakers' Dust.

TABLE

SHOWING AVERAGE WEIGHT PER FATHOM, ADMIRALTY TEST, AND SIZES OF CHAINS REQUIRED FOR VESSELS, ACCORDING TO THEIR REGISTERED TONNAGE. FOR LOW DECK VESSELS ADD ONE FIFTH TO THE TONNAGE.

Size.	Common Coil Weight in 100 feet.	Proved Av'g Weight per Fathom		Size of Rope.	Proof.		Ship's Tonnage.	Size of Anchor.
Inches.		Stud.	Short Link.	Inches.	Cable Chain.	B B B Crane Chain.		
3-16	50	.....	4	1	.....	.....	.....	.....
¼	80	.....	6	1¾	1	1½	.....	.....
5-16	100	.....	7	2⅛	1½	2	.....	.....
⅜	140	.....	9	3¼	2	3	.....	.....
7-16	210	.....	12	4	3	4	.....	.....
½	265	.....	15	4¾	4	5	30	150
9-16	320	.....	19	5⅛	5	6	50	200
⅝	420	.....	25	6¼	6	8	75	300
11-16	500	.....	3	7	8	10	100	400
¾	590	33	35	7¼	10	12	100	500
13-16	680	38	40	8⅛	12	14	110	600
⅞	790	43	46	9½	14	16	130	700
15-16	.....	50	54	10	16	18	160	800
1	.....	58	61	10¾	18	22	200	900
1 1-16	.....	65	69	11¼	20	26	240	1,100
1⅛	.....	72	76	12	23	28	280	1,300
1 3-16	.....	80	85	12¾	26	30	320	1,450
1¼	.....	89	95	13½	28	34	360	1,500
1 5-16	.....	98	104	14¼	30	37	400	1,750
1⅜	.....	110	115	15	34	41	440	1,900
1 7-16	.....	118	125	15½	37	44	500	2,100
1½	.....	128	135	16	41	48	550	2,300
1 9-16	.....	138	148	16½	44	52	600	2,500
1⅝	.....	150	160	17¼	48	66	700	2,700
1 11-16	.....	161	.....	18	52	.....	850	2,900
1¾	.....	175	.....	18½	56	.....	1,000	3,100
1 13-16	.....	188	.....	19¼	60	.....	1,150	3,300
1⅞	.....	200	.....	20	64	.....	1,300	3,500
1 15-16	.....	215	.....	21	68	.....	1,450	3,700
2	.....	230	.....	22	72	.....	1,600	3,900
2⅛	.....	250	.....	.....	80	.....	2,000	4,300
2¼	.....	290	.....	.....	88	.....	2,500	4,700

⅜ inch and smaller chains are made of full size iron; all other sizes exact. Tested to the English Admiralty Standard.

German Coil Chain.

Wire Gauge	5	6	7	8	9	10	11	12	13
Number	000	00	0	1	2	3	4	5	6
Weight in lbs. of 100 feet	37	30½	24	19	14¾	11¼	8¾	7	4½
Breaking Strength	695	580	520	488	360	322			

TRAVERS BROTHERS,

107 DUANE St. and 16 THOMAS St.,

NEW YORK.

Manufacturers and Sole Agents for

Peerless Sash Cords AND Twines

BRAIDED EDGE

MEXICAN HAMMOCKS.

PEERLESS HAMMOCK SPREADERS,
ANCHOR HAMMOCK ROPES,

LIBERTY MILLS

TWINES and CORDS,

Harmony Mills Twines and Cords,

Peerless Sea Island Twines,

GEM SEA ISLAND and COTTON TWINES,

Peerless Hammock Hooks.

AGENTS FOR

THE SILVER LAKE COMPANY'S

SOLID BRAIDED

SASH CORDS AND LINES.

Office and Salesrooms,
107 Duane st. and 16 Thomas st.,
NEW YORK CITY.

APPROXIMATE WEIGHT and STRENGTH of CORDAGE.

Furnished by L. Waterbury & Co., New York City.

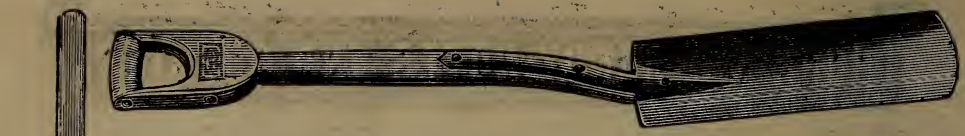
Circumference in inches.	Diameter in inches.	Weight of 100 fat'ms or 600 ft. in lbs.	Weight of 100 Fat'ms, Tarred in lbs.	Strength of New Ropes, in lbs.	No. of feet in 1 lb.
6 thd.	3/16 in.	12	17	540	50 feet,
9 "	1/4 "	18	24	780	33 " 4 in.
12 "	5/16 "	24	34	1000	25 "
15 "	3/8 "	30	45	1289	20 "
1 1/4 in.	7/16 "	37	50	1562	17 " 8 in.
1 1/2 "	1/2 "	46	55	2250	13 "
1 3/4 "	9/16 "	65	85	3062	9 " 3 in.
2 "	5/8 "	80	100	4000	7 " 6 in.
2 1/4 "	3/4 "	98	125	5000	6 "
2 1/2 "	13/16 "	120	155	6250	5 "
2 3/4 "	7/8 "	142	190	7500	4 " 3 in.
3 "	1 "	170	225	9000	3 " 6 in.
3 1/4 "	1 1/16 "	200	265	10500	3 "
3 1/2 "	1 1/8 "	230	300	12250	2 " 7 in.
3 3/4 "	1 1/4 "	271	350	14000	2 " 3 in.
4 "	1 5/16 "	310	405	16000	1 " 11 in.
4 1/4 "	1 3/8 "	346	455	18062	1 " 8 in.
4 1/2 "	1 1/2 "	390	510	20250	1 " 6 in.
4 3/4 "	1 9/16 "	435	575	22500	1 " 5 in.
5 "	1 5/8 "	480	640	25000	1 " 3 in.
5 1/2 "	1 3/4 "	581	775	30250	1 "
6 "	2 "	678	930	36100	10 3/3 in.
6 1/2 "	2 1/8 "	797	1075	42250	9 in.
7 "	2 1/4 "	920	1245	49000	7 2/3 in.
7 1/2 "	2 3/8 "	1106	1405	56250	6 1/2 in.
8 "	2 5/8 "	1265	1600	64000	5 1/2 in.
8 1/2 "	2 7/8 "	1420	1780	72250	5 in.
9 "	3 "	1572	2030	81000	4 1/2 in.
9 1/2 "	3 1/8 "	1760	2285	90250	4 in.
10 "	3 3/8 "	1951	2550	100000	3 1/2 in.

The relative strength of Manila to Sisal is about as 7 is to 5; or Manila is about 25 per cent. stronger than Sisal. Hawser-laid Rope will weigh one-sixth less.

Number of Railroad Spikes Used to One Mile of Track.

Size measured under head.	Average No. per keg of 200 lbs.	Ties 2 feet between centers, 4 spikes per tie makes per mile.	Rail used, weight per yard.
5 1/2 x 9/16	375	5870 lbs = 29 1/3 kegs.	45 to 70
5 x 9/16	400	5170 " = 26 "	40 to 56
5 x 1/2	450	4660 " = 23 1/3 "	35 to 40
4 1/2 x 1/2	530	3960 " = 20 "	28 to 35
4 x 1/2	600	3520 " = 17 2/3 "	24 to 35
4 1/2 x 7/16	680	3110 " = 15 1/2 "	20 to 30
4 x 7/16	720	2910 " = 14 3/4 "	
3 1/2 x 7/16	900	2350 " = 11 "	16 to 25
4 x 3/8	1000	2090 " = 10 1/2 "	
3 1/2 x 3/8	1190	1780 " = 9 "	16 to 20
3 x 3/8	1240	1710 " = 8 1/2 "	
2 1/2 x 3/8	1342	1575 " = 7 7/8 "	12 to 16

SEE PAGE 119.



Established 1855. *Centennial Award 1876.*

KEYSTONE WORKS.

GEORGE GRIFFITHS CO.

MANUFACTURER OF

SOLID CAST STEEL

Shovels, Spades and Scoops

—AND—

DRAINAGE TOOLS,

Quality and Finish Guaranteed.

We make Drain Cleaners,

ALL SIZES.

Cast-Steel Wire Potato Scoops.

Malleable Iron Screening Scoops.

Shovel, Spade and Fork Handles. Coal Hods, Well Buckets, Chamber Pails, Ash Cans and Ash Barrels, Stove Shovels, Pokers, Pans, Etc.

NOS. 511, 513 & 515 LOCUST ST.,

Philadelphia, Pa., U. S. A.

Send for Price List.

OVAL SLIDE VISES.

SIZES OF SCREWS AND LENGTH OF JAWS.

Nos.	00	0	1	2	3	4
Sizes of Screws .....inches	1/2	5/8	3/4	7/8	1	1 1/8
Length of Jaws.....inches	2	2 1/2	3	3 1/2	4	4 1/2
Weight, pounds.....	7 3/4	11	18	29	36 1/2	54

SOLID BOX VISES.

LENGTH OF JAW TO EACH SIZE MANUFACTURED.

Nos.....	35	40	45	50	55	60	65	70	75	80	85	90
Length of Jaws inches.....	3 3/4	4	4 1/4	4 1/2	4 3/4	5	5	5 1/4	5 1/4	5 1/2	5 1/2	5 3/4
Weight, pounds (about).....	35	40	45	50	55	60	65	70	75	80	85	90

SOLID BOX VISES.—(Continued.)

Nos.....	95	100	110	120	130	140	150	160	170	180	190	200
Length of Jaws inches.....	5 3/4	6	6	6 1/2	6 1/2	7	7	7 1/4	7 1/4	7 1/2	7 3/4	8
Weight, pounds (about).....	95	100	110	120	130	140	150	160	170	180	190	209

Rope and Iron Strapped Tackle Blocks.

DIAMETER OF SHEAVES, AND SIZE OF ROPE TAKEN BY EACH.

Length of Blocks,	inches.	4	5	6	7	8
Diameter of Wheels,	"	2 1/2	3	3 1/2	4 1/4	5
Diameter of Rope,	"	1/2	5/8	3/4	7/8	1

Length of Blocks,	inches.	9	10	11	12	
Diameter of Wheels,	"	5 3/4	6 1/2	7 1/4	8	
Diameter of Rope,	"	1	1 1/8	1 1/8	1 1/4	

Thick Mortise Blocks.

Length of Blocks,	inches.	9	10	11	12	15
Diameter of Wheels,	"	5 3/4	6 1/2	7 1/4	8	
Diameter of Rope,	"	1 1/4	1 3/8	1 1/2	1 1/2	

Size of Fry Pans.

No.....	0	1	2	3	4	5	6	7	8
Size across top.	8	8 1/2	9	9 1/2	10	11 1/4	12	13	14 inch.

"WESTERN" FILES,

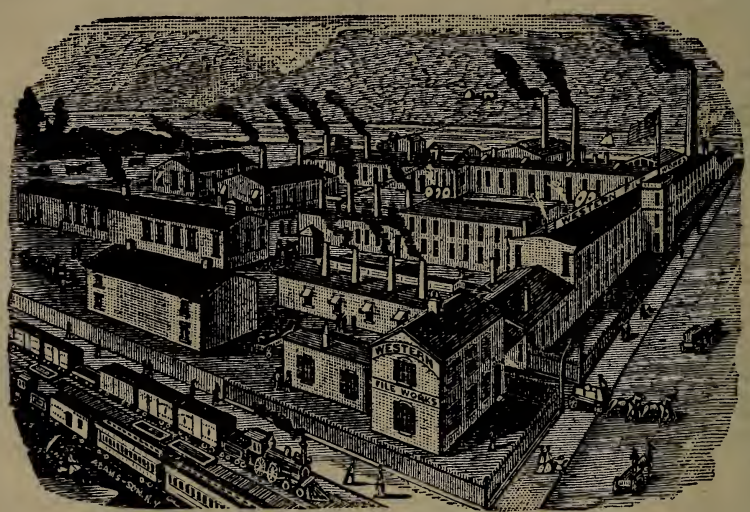
BEST CAST STEEL FILES,

WARRANTED TO BE UNEQUALLED IN THE MARKET,

FOR SALE BY

Iron and Hardware Dealers

THROUGHOUT THE UNITED STATES AND CANADA.



All Descriptions of Files

MADE TO ORDER.

WESTERN FILE CO., Limited.

BEAVER FALLS,

PENNSYLVANIA.

REGULAR STANDARD SIZES OF FILES.

[Expressed as nearly as possible without the use of Decimals.]

Length.	Mill-Saw Files.	Flat.	Hand.	Half Round.	Round and Square.	Cabinet Files.	Regular Taper Files.	Slim Taper Files.	Pit Saw Files.	Warding Files.
3 in.	11/32 × 1/16 in.	5/16 × 5/64 in.	7/16 × 3/32 in.	5/16 × 3/32 in.	1/8 in.		1/4 in.	3/16 in.	1/4 × 1/8 in.	3/8 × 3/64 in.
3½ in.							9/32 "	7/32 "	9/32 × 3/64 "	7/16 × 3/64 "
4 in.	7/16 × 5/64 "	7/16 × 3/32 "	1/2 × 1/8 "	7/16 × 1/8 "	5/32 "		5/8 "	1/4 "	5/16 × 5/32 "	15/32 × 1/16 "
4½ in.							13/32 "	9/32 "	11/32 × 11/64 "	1/2 × 1/16 "
5 in.	1/2 × 3/32 "	1/2 × 1/8 "	5/8 × 5/32 "	1/2 × 5/32 "	3/16 "		7/16 "	9/32 "	3/8 × 3/16 "	17/32 × 5/64 "
5½ in.							15/32 "	11/32 "		19/32 × 5/64 "
6 in.	5/8 × 1/8 " scant.	5/8 × 5/32 "	3/4 × 3/16 "	5/8 × 3/16 "	7/32 "	11/16 × 9/64 in.	1/2 "	3/8 "		5/8 × 3/32 "
7 in.	3/4 × 1/8 " full.	3/4 × 3/16 "	13/16 × 13/64 "	3/4 × 13/64 "	1/4 "	13/16 × 5/32 "	9/16 "	7/16 "	7/16 × 7/32 "	
8 in.	13/16 × 5/32 "	13/16 × 13/64 "	7/8 × 7/32 "	13/16 × 15/64 "	9/32 "	7/8 × 11/64 "	5/8 "	1/2 "	1/2 × 1/4 "	
9 in.	7/8 × 11/64 "	7/8 × 7/32 "	1 × 1/4 "	7/8 × 1/4 "	5/16 "	1 × 3/16 "			9/16 × 9/32 "	
10 in.	1 × 3/16 "	1 × 1/4 "	1 3/32 × 9/32 "	1 × 9/32 "	3/8 "	1 1/8 × 7/32 "				
11 in.	1 3/32 × 13/64 "	1 3/32 × 9/32 "	1 3/16 × 19/64 "	1 3/32 × 5/16 "	7/16 "	1 3/16 × 1/4 "				
12 in.	1 3/16 × 7/32 "	1 3/16 × 19/64 "	1 1/4 × 5/16 "	1 3/16 × 11/32 "	1/2 "	1 1/4 × 1/4 "				
13 in.	1 1/4 × 15/64 "	1 1/4 × 5/16 "	1 11/32 × 11/32 "	1 1/4 × 3/8 "	9/16 "					
14 in.	1 11/32 × 1/4 "	1 11/32 × 11/32 "	1 7/16 × 3/8 "	1 11/32 × 13/32 "	5/8 "					
15 in.	1 7/16 × 9/32 "	1 7/16 × 3/8 "	1 1/2 × 13/32 "	1 7/16 × 7/16 "	11/32 "					
16 in.	1 1/2 × 19/64 "	1 1/2 × 13/32 "	1 9/16 × 7/16 "	1 1/2 × 15/32 "	3/4 "					

This Table of Sizes will give consumers, and all persons concerned in the use of Files, a fair idea of the sizes of the full parts of Files most generally used, It will also be found useful to persons who generally want Files of a certain width or thickness, and who may not know the corresponding length of such Files

RICHARDSON'S CELEBRATED SAWS

Are Unequalled for Quality, Temper and Workmanship. Taper Ground, Thin at Back, and Perfectly True,
AND HAVE JUSTLY ATTAINED AN ENVIABLE REPUTATION.

WE MAKE A FULL LINE OF

HAND, PANEL, RIP, BACK, COMPASS, BUTCHERS', CIRCULAR, MILL, and

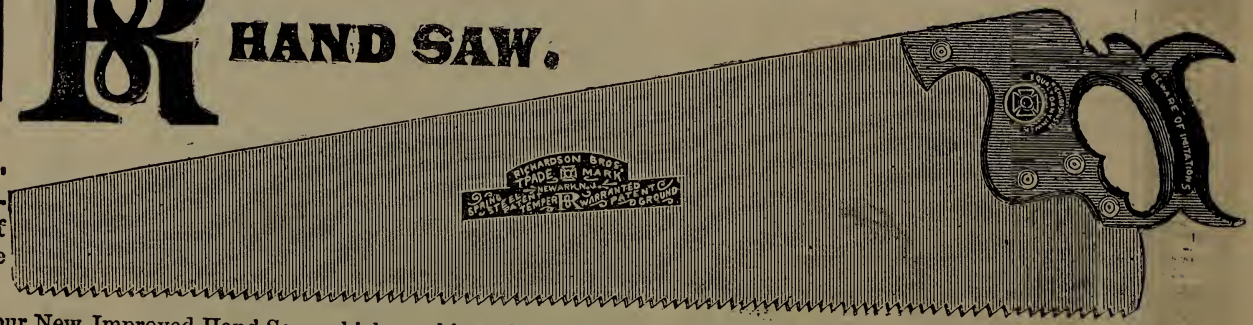
CROSS CUT SAWS.

Illustrated Catalogue sent on application.

Richardson's Trade Mark.

A Maltese Cross, with the letters BEST, emblematical of the standing of the Saws in the Trade.

R HAND SAW.



We give an illustration of our New Improved Hand Saw, which combines the most practical improvement yet offered on Saws. The position of the handle brings the blade or heel of the Saw nearer the hand, which makes it hang much lighter, and together with the additional Rivet, makes it the strongest and best Hand Saw in the market. We make this Saw in all lengths, and style it our R For price add $1.00 to List on regular No. 8.

SPECIAL SAWS, OR ANY SAWS NOT ON OUR LIST, MADE TO ORDER.

Richardson's Saw Works, 15 to 27 River St., Newark, N.J., U.S.A.

Standard Sizes of Circular Saw Mandrels.

No.	Diameter of Pulley.	Face of Pulley.	Diameter of Flange.	Length of Shaft.	Diameter of Shaft.	Size of Hole in Saw.
1	2½ ins.	3½ ins.	2½ ins.	14 ins.	1 1-16 in	1 in.
2	3 "	4 "	3 "	16 "	1 3-16 "	1⅛ "
3	3½ "	4½ "	3½ "	18 "	1 5-16 "	1¼ "
4	4 "	5 "	4 "	20 "	1 7-16 "	1 5-16 "
5	4½ "	5½ "	4½ "	22 "	1 7-16 "	1 5-16 "
6	5 "	6 "	5 "	24 "	1 7-16 "	1⅜ "
7	5½ "	6½ "	5½ "	26 "	1 7-16 "	1⅜ "
8	6 "	7 "	6 "	28 "	1 9-16 "	1½ "
9	7 "	8 "	6 "	32 "	1 11-16 "	1⅝ "
10	8 "	8 "	6 "	36 "	1 13-16 "	1⅞ "

When Ordering Circular Saws,

The following directions should be explicitly given:

Diameter of Saw in inches.
Thickness (or Gauge) of Saw at Rim.
Thickness (or Gauge) of Saw at Centre.
Log side, right or left hand, saw *cutting towards you.*
Number of Teeth in Saw.
Kind and number of Tooth.
Size of mandrel hole.
Size of pin hole.
Distance between pin holes from centre to centre.

Standard Gauges for Circular and Mill Saws.

Gauge.			Gauge.		
No. 4.....	¼ inch,	scant.	No. 11.....	⅛ inch,	scant.
" 5.....	7-32 "		" 12.....	3-32 "	full.
" 6.....	3-16 "	full.	" 13.....	3-32 "	scant.
" 7.....	3-16 "	scant.	" 14.....	5-64 "	full.
" 8.....	5-32 "		" 15.....	5-64 "	scant.
" 9.....	5-32 "	scant.	" 16.....	1-16 "	full.
" 10.....	⅛ "	full.			

A PERFECT
TOILET SOAP

IS

Lindley M. Elkinton's

PURE PALM

Pressed Cakes, $1.25 per dozen.
Old Dry Blocks, 10 cents per block.
Bars of Palm, 20 cents per pound.

TEST FOR TOILET SOAP:

Place the tongue on the Soap for one or two minutes, if a stinging sensation is felt, such Soap is not proper to use on the skin.

L. M. ELKINTON,
532 St. John Street, - Philadelphia, Pa.

THE OLD AND ONLY RELIABLE.

LATEST IMPROVED
FORT WAYNE

WESTERN WASHER.

Sold Entirely on its Merits.

We have furnished these Machines to an appreciative public for the past 12 years, during which time the demand for them has increased steadily and rapidly.

Each Machine is Warranted to Give Perfect Satisfaction.

We want this Machine represented in every city and town, and will give liberal discounts to dealers or agents, and guarantee sale and satisfaction of them

PRICE.

No. 1, Family Size	**$ 8 00**
No. 2, Large Family	**9 00**
No. 3, Hotel Size	**10 00**

Write for Catalogue and Terms to

The HORTON MFG. CO., Fort Wayne, Ind., U. S. A.

Standard Length of Cut of Hatchets and Bench Axes.

Nos	1	2	3
Shingling	$3\frac{1}{2}$	$3\frac{7}{8}$	$4\frac{3}{8}$ inches.
Claw	$3\frac{1}{2}$	$3\frac{7}{8}$	$4\frac{3}{8}$ inches.
Half	$3\frac{1}{2}$	$3\frac{7}{8}$	$4\frac{3}{8}$ inches.
Lath	$2\frac{1}{2}$	$2\frac{3}{4}$	3 inches.

No	1	2	3	4	5	6	7	8	9
Bench	$3\frac{3}{4}$	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6	$6\frac{3}{4}$	$7\frac{1}{2}$	$8\frac{1}{4}$	9 inches.

Weights of Washoe (Adz Eye) Picks.

RAILROAD PICKS.

Nos	1	2	3	4	5	6	7	8
Weight	5	$5\frac{1}{2}$	6	6	7	$7\frac{1}{2}$	8	$8\frac{1}{2}$ lbs.

MINING OR DRIFTING PICKS.

Nos	1	2	3	4	5	6	7	8	9
Weight	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6	$6\frac{1}{2}$	7 lbs.

POLL PICKS.

Nos	1	2	3	4	5	6	7	8	9
Weight	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6	$6\frac{1}{2}$	7	$7\frac{1}{2}$ lbs.

COAL PICKS.

Nos	1	2	3	4	5	6
Weight	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	6	$6\frac{1}{2}$ lbs.

Coes' (Genuine) Wrenches.

WILL TAKE NUTS OF THE FOLLOWING SIZES:

Size of Wrench	4	6	8	10	12	15	18	21 in.
Size of Nuts	$\frac{1}{2}$	$\frac{7}{8}$	$1\frac{1}{4}$	$1\frac{3}{4}$	$2\frac{1}{8}$	$2\frac{5}{8}$	3	$4\frac{1}{8}$ in.

Cast Steel Crowbars.

Size ..... Inches	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$
Usual Weight .. .. Lbs.	6	8	10	13	17	22	26
Usual Length ..... Inches	44	48	52	55	58	66	72

THE SUPERIOR LAWN MOWER.

SOME OF THE

SPECIAL ADVANTAGES

RECOMMENDING IT ARE:

1st—The ease and quickness with which **it can be adjusted to cut High and Low grass;** in a moment you can vary the cut from one-half to three and one-half inches.

2d—It is the only Mower in the market where the same machine **Can, in a Moment, be Adjusted to Cut** grass from **one to twelve inches** high.

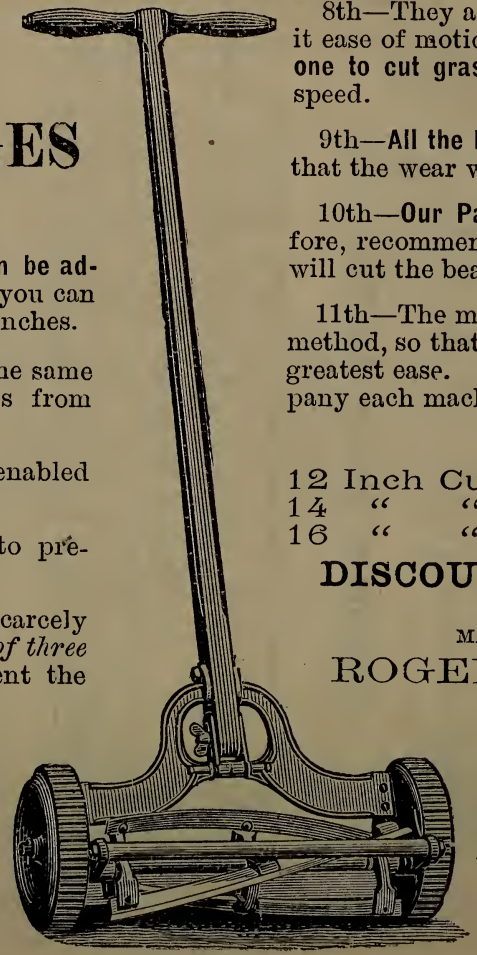
3d—Being a **Front-Cut Machine** the operator is enabled to cut grass close up to walls, fences, trees, etc.

4th—The Reel Knives are **protected by a Guard** to prevent them from cutting shrubbery, etc.

5th—The rachet or pawl has **no Spring,** makes scarcely any noise, *has eight catches in a circumference of three inches,* so that the reel starts to cutting the moment the machine is started forward.

6th—The material used is of the very best quality, so that **Breakages Seldom if Ever occur.**

7th—The **Knives** are made by a patented process, *of the best steel,* and are hardened and *tempered in oil.*



8th—They are made with the **double gear,** giving it ease of motion, combined with strength, **enabling one to cut grass rapidly** going at a slow rate of speed.

9th—**All the Bearings** in the Mower **are long,** so that the wear will be very slow.

10th—**Our Pawls will Not Gum or Stick,** we therefore, recommend to oil with machine oil. Coal oil will cut the bearings.

11th—The machine is sharpened by a very simple method, so that **even a child can sharpen it** with the greatest ease. A Crank and full directions accompany each machine.

PRICE LIST:

12 Inch Cut,	-	-	$13.00
14 " "	-	-	15.00
16 " "	-	-	17.00

DISCOUNT TO THE TRADE.

MANUFACTURED BY THE

ROGERS FENCE CO.,

Springfield, Ohio.

Sole Agents for New York City,

Quackenbush, Townsend & Co.,

85 Chambers and

67 Reade Sts.

Molasses Gates.

No.	1	2	3	4	5
Inside Diameter	13-16	⅞	1¼	1⅜	1½
Bore	1	1⅛	1⅜	1⅝	1 13-16

John Wilson's English Butcher Knives.

LENGTH OF BLADE OF EACH NO.

No.	026	26	27	28	29	30	
Length	4½	5	5¼	5½	6	6½	inches.

No.	43	44	45	46	47	48	49	86
Length	7	8	9	10	11	12	13	14 ins.

Eley Bros.' ("E. B.") Percussion Caps

ARE NUMBERED IN THIS MANNER:

Smallest..	No. 9	24	10	11	18	12	13	14	..Largest.

English Gun Gauge.

SIZES EXPRESSED IN PARTS OF AN INCH.

	Number.											
Bore	5	6	9	11	15	19	25	36	52	90	140	300
Inch	1	15-16	⅞	13-16	¾	11-16	⅝	9-16	½	7-16	⅜	5-16	¼

The Sizes of Skates

COMPARE WITH SIZES OF SHOES AS FOLLOWS:

Skates, Inches	7	7½	8	8½	9	9½	10	10½	11	11½
Shoes, No.	9¼	11	12½	1	2½	4	5½	7½	9	10½

Plate and Bedstead Casters.

SIZE, IN INCHES, OF WHEELS OF EACH.

Plate.....No	1	2	3	4	5	6	7
Size	⅞	1	1⅛	1¼	1⅜	1 7-16	1½

Bedstead, Old No.	1⅝.0	1⅝.1	1⅝.2	2 in 0	2 in 1	2 in 2	2 in heavy.
New "	101	102	103	104	105	106	107
Size	1⅜	1½	1⅝	1¾	1⅞	2	2¼

Hatter's Size Measure.

To obtain the correct size of the head, use a strip of paper—newspaper will do. Draw it tightly around the largest part of the head, and have the ends just meet. Then measure the length of the paper and the figures below will give you the size according to hatter's measure. An eighth of an inch either way will make no difference. These measures will answer for any style of hat or cap made:

18¾ inches is	5⅞	22¼ inches is	7
19 "	6	22½ "	7⅛
19⅜ "	6⅛	23 "	7¼
19½ "	6¼	23⅜ "	7⅜
20¼ "	6⅜	23½ "	7½
20¾ "	6½	24 "	7⅝
21 "	6⅝	24⅛ "	7¾
21¼ "	6¾	25 "	7⅞
21⅞ "	6⅞	25¼ "	8

— THE —

Union Nut Company,

99 Chambers Street

A. S. UPSON, Pres't.
S. FRISBIE, Sec. & Treas.

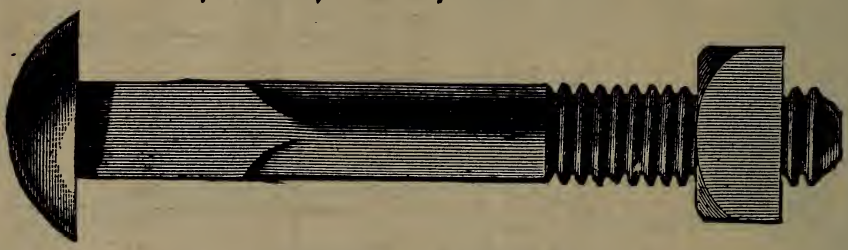
NEW YORK.

T. SMITH, Ass't Sec.
J. L. VARICK, Ass't Treas.

MANUFACTURERS OF

NUTS AND WASHERS,

CARRIAGE, TIRE, PLOW, STOVE, AGRICULTURAL & MACHINE



BOLTS,

Bolt Ends, Turn Buckles, Lag and Skein Screws,

Carriage Hardware,

Rules, Plumbs and Levels, Try Squares and T Bevels.

MANUFACTORIES,

UNIONVILLE, Conn., & CLEVELAND, Ohio.

AGENTS FOR

THE UPSON NUT CO., UNIONVILLE, CT.
THE UPSON NUT CO., CLEVELAND, O.
HOTCHKISS & UPSON CO.

STANDARD RULE CO.
ATHOL MACHINE CO.
BAILEY WRINGING MACHINE CO.

TABLE

Showing the average number of Cold Pressed Nuts in a keg, 150 lbs. each, Square and Hexagon of standard sizes, as adopted by "the Association of Bolt and Nut Manufacturers of the United States."

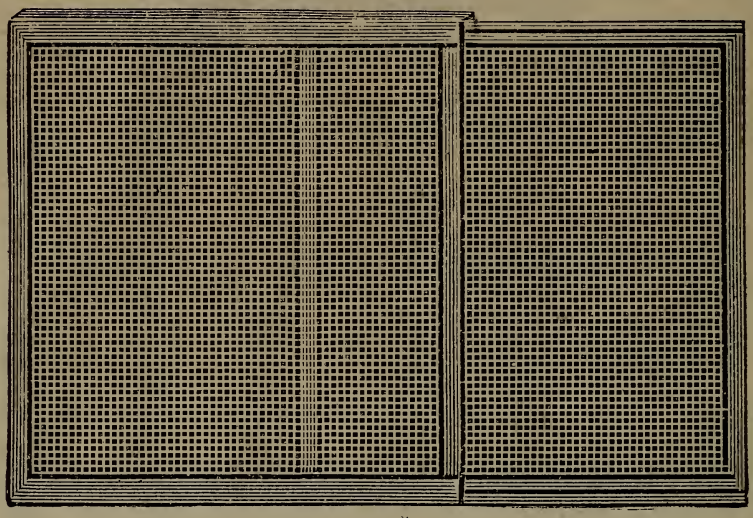
WIDTH.	THICKNESS.	HOLE.	BOLT.	NO. OF SQUARE	NO. OF HEXAGON.
11-32	5-32	3-32	1-8	45,000	
13-32	3-16	5-32	3-16	22,500	
1-2	1-4	7-32	1-4	10,000	10,500
5-8	5-16	9-32	5-16	5,106	6,666
3-4	3-8	11-32	3-8	2,727	4,528
7-8	7-16	13-32	7-16	1,904	2,057
7-8	1-2	7-16	1-2	1,695	1,890
1	1-2	7-16	1-2	1,218	1,538
1 1-8	1-2	1-2	4-16	1,016	1,245
1 1-8	5-8	9-16	5-8	885	957
1 1-4	5-8	9-16	5-8	638	740
1 3-8	3-4	21-32	3-4	450	555
1 1-2	3-4	21-32	3-4	368	430
1 5-8	7-8	25-32	7-8	260	270
1 3-4	7-8	25-32	7-8	243	252
1 3-4	1	7-8	1	249	257
2	1	7-8	1	163	204
2	1 1-8	15-16	1 1-8	143	168
2 1-4	1 1-8	15-16	1 1-8	109	150
2 1-4	1 3-8	1 1-16	1 3-8	85	120
2 1-2	1 1-4	1 1-16	1 1-4	84	93
2 3-4	1 3-8	1 3-16	1 3-8	55	60
3	1 1-2	1 5-16	1 1-2	51	56
3 1-4	1 5-8	1 7-16	1 5-8	39	44
3 1-2	1 3-4	1 9-16	1 3-4	32	35
3 3-4	1 7-8	1 11-16	1 7-8	28	30
4	2	1 13-16	2	20	22

BAR AND SHEET LEAD—Weight in Pounds

Thickness, or Diameter, or Side; Inches.	Sheets per Square Foot.	Square Bars 1 Foot Long.	Round Bars 1 Foot Long.	Thickness, or Diameter, or Side; Inches.	Sheets per Square Foot.	Square Bars 1 Foot Long.	Round Bars 1 Foot Long.
1-16	3.71	.02	.014	1 1-16	63.2	5.6	4.4
1-8	7 43	.079	.06	1-8	66.87	6.26	4.91
3-16	11.	.175	136	3-16	70.51	6.98	5.5
1-4	14 08	.31	.245	1-4	74.35	7.74	6.1
5-16	18.05	.486	.38	5-16	78.05	8.55	6.73
3-8	22 02	.695	.542	3-8	81.76	9.38	7 38
7-16	26.	.948	745	7-16	85 48	10.18	8.05
1-2	29.75	1.25	.975	1-2	89.23	11.0	8.75
9-16	33.49	1.55	1.24	9-16	93.	12.05	9.50
5-8	37.18	1.95	1.51	5-8	96.78	13.15	10.25
11-16	40.87	2.33	1.85	11-16	100.5	14.15	11.06
3-4	44.53	2.8	2.2	3-4	104.1	15.18	11.88
13-16	48.28	3.28	2.58	13 16	107.8	16.30	12.76
7-8	52.12	3.8	2.93	7-8	112.3	17.45	13.66
15-16	56.05	4.35	3.41	15-16	116.	18.10	14.61
1	59.43	4.95	3.9	2	119 6	19.78	15.58

ROEBUCK'S

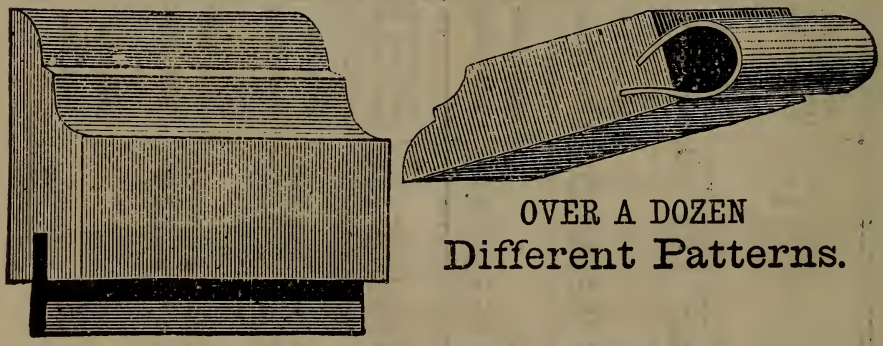
Adjustable Wire Window Screens.



WILL FIT ANY WINDOW.

ROEBUCK'S CELEBRATED WEATHER STRIPS.

THE BEST IN USE.



OVER A DOZEN
Different Patterns.

S. ROEBUCK,

164 FULTON STREET,
NEW YORK.

TABLE

SHOWING THE AVERAGE NUMBER OF WASHERS IN A KEG OF 150 LBS., OF EACH STANDARD SIZE,

As Adopted by "The Association of Bolt and Nut Manufacturers of the U. S."

Diameter.	Size of Hole	Thickness Wire Gauge.	Size of Bolt	No. in 150 lbs
1-2	1-4	No. 18	3-16	80.000
5-8	5-16	" 16	1-4	34.285
3-4	5-16	" 16	1-4	22.000
7-8	3-8	" 16	5-16	18.500
1	7-16	" 14	3-8	10.550
1 1-4	1-2	" 14	7-16	7.500
1 3-8	9-16	" 12	1-2	4.500
1 1-2	5-8	" 12	9-16	3.850
1 3-4	11-16	" 10	5-8	2.500
2	13-16	" 10	3-4	1.600
2 1-4	15-16	" 9	7-8	1.300
2 1-2	1 1-16	" 9	1	950
2 3-4	1 1-4	" 9	1 1-8	700
3	1 3-8	" 9	1 1-4	550
3 1-2	1 1-2	" 9	1 3-8	450

PERKINS HORSE SHOES.

Weight expressed in ounces.

Front Shoes, No.	0	1	2	3	4	5	6	7	8
Light	13	15	17	21	24	29	35		
Medium		17	20	24	28	34	38		
Heavy		19	22	27	32	36	41	49	54
Hind Shoes, No.	0	1	2	3	4	5	6	7	8
Light	10	12	15	18	22	26	31		
Medium		14	16	20	24	28	33		
Heavy		14	17	21	25	30	34	38	43
Mule, No.	1	2	3	4	5	6	7		
Front Shoes	10	12	15	18	22	25	29		

"Ausable" Horse Shoe Nails.

STANDARD SIZES.

No.	4	5	6	7	8	9	10	12
Length in inches.	$1\frac{5}{8}$	$1\frac{15}{16}$	$2\frac{1}{32}$	$2\frac{1}{4}$	$2\frac{7}{16}$	$2\frac{9}{16}$	$2\frac{11}{16}$	$3\frac{1}{16}$
Number in pound	276	168	138	110	96	80	73	57

PROPORTIONS FOR

United States Standard Screw Threads and Nuts.

From HOOPES & TOWNSEND.

Diameter of Screw.	Threads per inch.	Diameter at root of Thread.	Short Diameter.	Long Diameter.	Long Diameter	Thickness
1-4	20	.185	1-2	37-64	7-10	1-4
5-16	18	.240	19-32	11-16	10-12	5-16
3-8	16	.294	11.16	51-64	63-64	3-8
7-16	14	.344	25-32	9-10	1 7-64	7-16
1-2	13	.400	7-8	1	1 15-64	1 2
9-16	12	.454	31-32	1 1-3	1 23-64	9-16
5-8	11	.507	1 1-16	1 7-32	1 1-2	5-8
3-4	10	.620	1 1-4	1 7-16	1 49-64	3-4
7-8	9	.731	1 7-16	1 21-32	2 1-32	7-8
1	8	.837	1 5-8	1 7-8	2 19-64	1
1 1-8	7	.940	1 13-16	2 3-32	2 9-16	1 1-8
1 1-4	7	1 065	2	2 5-16	2 53-64	1 1-4
1 3-8	6	1.160	2 3-16	2 17-32	3 3-32	1 3-8
1 1-2	6	1.284	2 3-8	2 3-4	3 23-64	1 1-2
1 5-8	5 1-2	1.389	2 9-16	2 31-32	3 5-8	1 5-8
1 3-4	5	1.491	2 3-4	3 3-16	3 57-64	1 3-4
1 7-8	5	1.616	2 15-16	3 13-32	4 5-32	1 7-8
2	4 1-2	1.712	3 1-8	3 5-8	4 27-64	2
2 1-4	4 1-2	1 962	3 1-2	4 1-16	4 61-64	2 1-4
2 1-2	4	2.176	3 7-8	4 1-2	5 31-64	2 1-2
2 3-4	4	2.426	4 1-4	4 29-32	6	2 3-4
3	3 1-2	2.629	4 5-8	5 3-8	6 17-32	3
3 1-4	3 1-2	2.879	5	5 13-16	7 1-16	3 1-4
3 1-2	3 1-4	3.100	5 3-8	6 7-64	7 39-64	3 1-2
3 3-4	3	3.317	5 3-4	6 21-32	8 1-8	3 3-4
4	3	3.567	6 1-8	7 3-32	8 41-64	4

WEIGHT OF STEEL TIRE PER SET OF 54 FEET.

5-8x1-16	3-4x3-32	7-8x3-32	1x1-8	1x5-16	1 1-4x1-4	1 1-2x7-16
7 1-2	13 1-4	15 1-4	23 3-4	58 1-2	59	124
5-8x3-32	3-4x1-8	7-8x1-8	1x5-32	1 1-8x3-16	1 1-4x5-16	1 1-2x1-2
11 1-2	18	20 1-4	29 1-2	40 1-2	74	142
5-8x1-8	3-4x5-32	7-8x5-32	1x3-16	1 1-8x1-4	1 1-4x3-8	1 5-8x1-2
15 1-4	22	25	35 1-2	54	88 1-2	154
5-8x3-16	3-4x3-16	7-8x3-16	1x7-32	1 1-8x5-16	1 3-8x3-8	1 3-4x1-2
22 3-4	27	30 1-2	42 1-4	67 1-2	98	165
7-8x7-32	3-4x1-4	7-8x1-4	1x1-4	1 1-8x3 8	1 1-2x3-8	2x1-2
35 1-2	35 1-2	40 1-2	47 1-2	81	107	190

Have a clean fire: and weld with equal parts of Borax, Salt and Sand.

JOHN H. GRAHAM. WM. A. GRAHAM.

JOHN H. GRAHAM & CO.,

ESTABLISHED 1870.

P.-O. Box 1042. **113 Chambers St. and 95 Reade St., New York.**

Hardware Manufacturers' Agents.

All Goods at Factory Prices.

AMERICAN SCREW CO.,
Round-head, Flat-head and Brass Screws.
HENRY DISSTON & SONS,
Saws, Tools, Files, &c.
HARTFORD HAMMER CO.,
Hammers forged from Solid Cast-Steel.
LANE BROS.,
Grocers, Coffee-mills, Self-Measuring Faucets, &c.
IRON CITY TOOL WORKS,
Vises, Picks, Mattocks, Grub-Hoes, &c.
A. W. BRINKERHOFF & SON.
"Universal" Corn-Huskers.
BURRELL & WHITMAN.
Butter, Cheese and Flour-Tryers, &c.
TAYLOR BROS.,
Thermometers, Storm Glasses, &c.
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Mechanics' and Plumbers' Tools, Skates, &c.
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DETROIT BLOCK WORKS,
Tackle Blocks, &c.
LAWRENCE CURRY-COMB CO.,
Boring Machines, &c.
A. G. COES & CO.,
Coes's Genuine Screw Wrenches.
ISAAC F. BLOODGOOD CO.,
Sand and Emery Paper, Emery Cloth, &c.
LORING & PARKS,
Tacks, Brads, Nails and Plymouth Rivets.
HARRISBURG HANDLE CO.,
Axe, Pick, Hammer Handles, &c.
EDWARD STORM SPRING CO.,
Cannon's Diamond-Point Nail Sets.
BOSTWICK & BURGESS,
Queen Carpet-Sweepers.
TUCKER & DORSEY, Alarm Tills.
AMERICAN MACHINE CO.,
Freezers, Fluters, Wringers, &c.
GAY & PARSONS,
Ratchet Screw-Drivers.
D. W. BOSLEY & CO.,
Weather Strip, Window-Cleaners, &c.
CHADBORN & COLDWELL MFG. CO.,
Lawn-Mowers.
E. S. HOTCHKISS, Rat-Killers.
HOWARD BROS.,
Cotton, Wool and Curry Cards.
W. H. HOWELL & CO.,
Geneva Fluter, Laundry Irons, &c.
PHŒNIX CASTER CO.,
Martin's Patent Casters.
DOUBLE-POINTED TACK CO.,
Staples, &c.
PORTER MFG. CO., Screen Corners.
BARTON BELL CO.
UNITED STATES CORD CO.,
Braided Sash Cord.
H. KNICKERBACKER,
Scythes, Axes and Tools.
G. M. EDDY & CO.,
Measuring Tapes, largest line in the world.
J. MALLINSON,
Cast-Steel Shears and Scissors.
DERBY & BALL, Scythe-Snaths.
SEYMOUR SMITH & SON,
Breast Drills, Saw Setts, Pruning Shears, &c.
OTSEGO FORK MILLS CO.,
Steel Forks, Rakes, Hoes, &c.
C. S. BELL CO.,
Farm and Church Bells.
NEW HAVEN COPPER CO.,
Cast-Steel Augers and Bitts, all kinds and sizes.
KENTUCKY BELL CO.,
The "Dodge" Cow-Bell.
J. S. COWDERY, Carpenters' Chalk.
ROMER & CO., Brass and Iron Padlocks
H. B. IVES,
Ives Burglar-Proof Door-Bolts.
CHALFANT MFG. CO.,
Polishing and Gas Toilet-Irons.
RIPLEY MFG. CO.,
Bung-Starters, Mallets, &c.
FRED. J. MYERS MFG. CO.,
Corn-Poppers, Fly-Traps and Wire Goods.
AMIDON & WHITE, Braces.
CRONK HANGER CO.,
Barn-Door Hangers, Plyers, &c.

APPROXIMATE WEIGHTS OF STRAP AND T HINGES.

Weight per dozen. Furnished by Stanley Works.

HEAVY STRAP HINGES.

Size	4	5	6	8	10	12	14	16	ins.
Weight.	6¾	10½	19½	32¼	55¼	74½	89¼	103½	lbs.

EXTRA HEAVY T HINGES.

Size.....	6	8	10	12	14	16	ins.
Weight	20¾	34 ¼	54	78	83¼	87¾	lbs.

STRAP AND T HINGES ARE COUNTERSUNK FOR SCREWS.

Inches		3	4	5	6	8	10	12	14	16	18
Light Strap..	Size Screws	6	7	8	9	10	10	12	13	13	
Heavy Strap.....	"		9	9	11	12	14	16	16	16	
Light T...	"	7	7	8	8	9	10	11	12		
Heavy T.....	"				9	10	11	12	13	13	13
Extra Heavy T	"			10	11	13	14	16	16	16	
Hinge Hasps.....	"	6	7		9	10	10	12			

WROUGHT BUTTS—Countersunk for Screws.

TABLE BUTTS AND BACK FLAPS.

Inches	⅞	1	1⅛	1¼	1⅜	1½	1⅝	1¾	2⅞	2
Size Screw	6	6	7	7	7	8	8	9	9	9

NARROW WROUGHT BUTTS.

Inches..	1	1¼	1½	1¾	2	2¼	2½	2¾	3	3¼	3½	3¾	4	4½	5	5½	6
Screws..	5	6	7	7	8	8	9	9	10	12	12	12	12	14	14	14	14

LIGHT NARROW AND LIGHT LOOSE PIN.

Inch	¾	1	1¼	1½	1¾	2	2¼	2½	3
Screws.....	2	3	3	5	5	6	6	6	7

LOOSE PIN OR BROAD.

Size.....	2x2 to 2½x2	2½x2½ to 3x3	3x3½	3½x3 to 4½x4	4½x4½ to 5½	5x5 to 6x7
Screws.....	9	10	11	12	13	14

CAST BUTTS

ARE COUNTERSUNK FOR SCREWS AS FOLLOWS:

NARROW, FAST OR LOOSE JOINT.

Inch.....	1⅛	1¼	2	2¼	2½	3	3¼	3½	4	4½	5	6
Screws	6	7	7	8	8	8	10	10	10	12	14	12

PARLIAMENT.

Inch.....	2½ to 3½	3¾ and 4	4½ to 7½	8 and 8½
Screw	8	10	11	13

BROAD, FAST, AND LOOSE JOINT AND LOOSE PIN.

Inch.....	2x2 to 2½x3	3x2½ to 3½x3½	3½x4
Screw	8	10	11

Inch	3½x5	4x3	4x3½ to 4½x4½	4½x5 and upwards
Screw.....	10	10	11	13

CORRUGATED

IRON ROOFING

SIDING, CEILING, ARCHES AND LATH.

CINCINNATI CORRUGATING CO.

CINCINNATI. O.

SEND FOR ILLUSTRATED CATALOGUE.

STANDING SEAM

THE CENTENNIAL RAIN-WATER CUT-OFF.

PATENTED APRIL 18, 1876.

"Success is the Measure of Merit."

This cut-off has been on the market but three years, and to-day it is the favorite with the trade throughout the United States and Canada.

RIGHT-HAND WIRE. SECTIONAL VIEW. LEFT-HAND WIRE.

They are made in all sizes from two inches up, of TIN or GALVANIZED IRON. They are nicely japanned, and put up in crates of one dozen each (assorted—right and left-hand wires), so they may be used in any position without extra pipe or elbows.

The following are Regular Sizes Carried in Stock:

2 in. Tin	*per doz.*	*$4 00*	*3 in. Galvanized Iron, per doz.*				*$8 00*
3 in. Tin	*"*	*5 00*	*4 "*	*"*	*"*	*"*	*12 00*
4 in. Tin	*"*	*8 00*	*5 "*	*"*	*"*	*"*	*16 00*
5 in. Tin	*"*	*13 00*	*6 "*	*"*	*"*	*"*	*20 00*
6 in. IX	*"*	*18 00*	*7 "*	*"*	*"*	*"*	*25 00*
			8 "	*"*	*"*	*"*	*30 00*

☞Ask your jobber for them, or write to the undersigned, who will give you manufacturer's prices. Manufactured by

W. P. MYER, 22, 24 and 26 E. SOUTH St., INDIANAPOLIS, Ind.

☞ASK US FOR PRICE ON A SAMPLE ORDER.

WROUGHT BRASS BUTTS.

Width when Open, and Sizes of Screws Required.

WIDTH OF BRASS BUTTS, WHEN OPEN.

Size.....Inches	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{3}{4}$
Narrow .....Width	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$
Middle	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{7}{8}$	$\frac{7}{8}$	1	1	1	1
Broad.....	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	1	1	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{8}$
Desk.....	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{5}{8}$	$1\frac{3}{4}$	$1\frac{7}{8}$	2	$2\frac{1}{8}$	$2\frac{1}{4}$	$2\frac{1}{2}$

Size.....Inches	$1\frac{7}{8}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{4}$	$3\frac{1}{2}$	...
Narrow .....Width	1	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{1}{8}$	$1\frac{5}{8}$	$1\frac{3}{4}$	2	...
Middle	$1\frac{1}{8}$	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{3}{4}$	$1\frac{7}{8}$	$2\frac{1}{8}$	...
Broad.....	$1\frac{1}{4}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$	$1\frac{7}{8}$	2	$2\frac{1}{4}$	..
Desk	$2\frac{3}{4}$	3	..	...	...	...	...	...	...

BRASS BUTTS ARE COUNTERSUNK FOR SCREWS AS FOLLOWS:

Size.....Inch	$\frac{1}{2}$	$\frac{3}{4}$	$\frac{7}{8}$	1	$1\frac{1}{8}$	$1\frac{1}{4}$	$1\frac{3}{8}$	$1\frac{1}{2}$	$1\frac{5}{8}$
Narrow....Size of Screw	0	1	1	2	2	3	4	4	4
Middle	0	1	1	2	2	3	4	4	4
Broad.....	0	1	1	2	2	3	4	4	4
Desk	1	2	2	4	4	4	4	5	5

Size.....Inch	$1\frac{3}{4}$	$1\frac{7}{8}$	2	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	3	$3\frac{1}{4}$	$3\frac{1}{2}$
Narrow....Size of Screw	4	5	5	5	6	6	7	7	8
Middle	4	5	5	5	6	6	7	7	8
Broad.....	4	5	5	5	6	7	7	7	8
Desk.....	6	6	7	...	...	...	...	...	...

EMERY AND CORUNDUM

ARE RANKED OR GRADED AS FOLLOWS:

Nos.	8–10.....	Represents a Wood rasp.
"	16–20.....	" Rough file.
"	24–30.....	" Middle cut file.
"	36–40.....	" Bastard cut file.
"	46–60.....	" Second cut file.
"	70–80.....	" Smooth cut file.
"	90–100.....	" Superfine cut file.
"	120–FFF.....	" Dead smooth file.

Baeder & Adamson's Emery Paper and Cloth

COMPARE WITH GRADE AS FOLLOWS:

Nos.	000	00	0	100	$\frac{1}{2}$	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3
Emery....	Crocus	Flour	120	100	90	80	70	60	54	46

SPECIAL NOTICE TO THE TRADE.

EUREKA FIRE HOSE COMPANY,

13 BARCLAY STREET, New York.

MANUFACTURERS OF

SEAMLESS COTTON AND MILDEW-PROOF, RUBBER LINED

"EUREKA GARDEN HOSE"

This Company for the seasons trade in **GARDEN HOSE** invites the especial attention of dealers, and solicits their orders for our products of Hose for Household purposes. This hose is known as the **"EUREKA GARDEN HOSE,"** which we have greatly improved in appearance and weaving —unequalled by any and the very best Hose in the market.

Eureka Garden Hose sells on sight.

It is **Superior to the Best Rubber Hose** for durability and strength. It is mildew-proof and will stand over 500 lbs. pressure per square inch and outlast Rubber Hose many times over **EXPOSE IT TO DRY AFTER USE,** though it may be soaked every time it is used; having no outside covering to imprison the moisture, will, if given a fair chance, dry immediately, no gas is generated and the cotton is uninjured. This is a proven fact in fire departments, where our rubber lined Cotton Hose has been known to outlast all others many years.

After use **DO NOT REEL UP WET, BUT PUT THIS HOSE IN THE SUN AND AIR WHERE IT CAN DRY,** and it will last many years.

Once handled by the Trade, and used by the Consumer, it has given the highest satisfaction to both parties.

THE EUREKA GARDEN HOSE CANNOT BE INJURED BY EXPOSURE TO THE SUN, same as Rubber Hose.

—PRICE LIST.—

½	Inch	Eureka	Garden	Hose,	-	-	20	Cents	per	Foot.
¾	"	"	"	"	-	-	-	25	"	"	"
1	"	"	"	"	-	-	35	"	"	"	"

"SEND FOR SAMPLES."

Subject to Liberal Discount to the Trade. Couplings attached and Pipes Furnished when required.

SPUN BRASS KETTLES,

WEIGHT AND CAPACITY OF.

7 in.....	1 lb.....	½ gal	18 in.....	10½ lb.....	10 gal
8 "	1½ "	1 "	19 "	12½ "	12 "
9 "	2½ "	1½ "	20 "	16½ "	14 "
10 "	3 "	2 "	21 "	18 "	17 "
11 "	3½ "	2½ "	22 "	20 "	18 "
12 "	4 "	3 "	23 "	23 "	23 "
13 "	5 "	4 "	24 "	27½ "	25 "
14 "	5¾ "	4½ "	25 "	29 "	30 "
15 "	6½ "	5 "	26 "	32 "	32 "
16 "	7½ "	6 "	27 "	37 "	37 "
17 "	9 "	8 "	28 "	40 "	42 "

Number of Copper Belt Rivets and Burs in one Pound.

Inch....	¼	5/16	⅜	7/16	½	9/16	⅝	¾	⅞	1	1⅛	1¼	1½	Burs
No. 7...	272	250	228	180	164	160	148	112	116	100	84	80	69	345
" 8...	276	248	208	200	178	172	152	136	110	104	96			390
" 9...	340	280	272	248	228	220	184	176	156	136				610
" 10..	544	448	384	340	304	300	272	238	204					716
" 12...	588	512	452	404	354	334	304	272						985
" 13...	996	852	532											1630

Copper Hose Rivets and Burs.

Size.....	5/16	⅜	7/16	½	9/16	⅝	¾	⅞	Burs.
No. 7....			155	142	133	122	109	97	345
" 8....	308	201	181	160	150	135	116	100	390

Copper Oval Head (or Trunk) Rivets and Burs.

	¼	5/16	⅜	7/16	½	9/16	⅝	¾	⅞	1	1⅛	1¼	Burs
No. 9.....	320	285	259	243	219	199	177	159	137	123	113	104	610

Number of Copper Braziers' Rivets in one Pound.

Nos	0	1	2	3	4	5	6	7	8	9	10
	148	100	70	44	34	24	18	12	9	6	4

BUILDERS' REFERENCE TABLES.

Size of Glass in Windows.			Size of Sash and Frame.	Weights.	
12 Lights.	8 Lights.	4 Lights.		$1\frac{1}{4}$	$1\frac{1}{2}$
				Lbs.	Lbs.
8x10	12 x10	12 x20	2.4 x3.10	4	5
8x12	12 x12	12 x24	2.4 x4.6	$4\frac{1}{2}$	5
9x12	$13\frac{1}{2}$x12	$13\frac{1}{2}$x24	2.7 x4.6	5	$5\frac{1}{2}$
9x13	$13\frac{1}{2}$x13	$13\frac{1}{2}$x26	2.7 x4.10	$5\frac{1}{2}$	$5\frac{1}{2}$
9x14	$13\frac{1}{2}$x14	$13\frac{1}{2}$x28	2.7 x5.2	$5\frac{1}{2}$	6
9x15	$13\frac{1}{2}$x15	$13\frac{1}{2}$x30	2.7 x5.6	$5\frac{1}{2}$	$6\frac{1}{2}$
9x16	$13\frac{1}{2}$x16	$13\frac{1}{2}$x32	2.7 x5.10	6	$6\frac{1}{2}$
10x12	15 x12	15 x24	2.10x4.6	$5\frac{1}{2}$	6
10x14	15 x14	15 x28	2.10x5.2	6	$6\frac{1}{2}$
10x15	15 x15	15 x30	2.10x5.6	6	7
10x16	15 x16	15 x32	2.10x5.10	$6\frac{1}{2}$	$7\frac{1}{2}$
10x18	15 x18	15 x36	2.10x6.6	7	8
10x20	15 x20	15 x40	2.10x7.2	8	9
11x14	$16\frac{1}{2}$x14	$16\frac{1}{2}$x28	3.1 x5.2	6	7
11x15	$16\frac{1}{2}$x15	$16\frac{1}{2}$x30	3.1 x5.6	$6\frac{1}{2}$	$7\frac{1}{2}$
11x16	$16\frac{1}{2}$x16	$16\frac{1}{2}$x32	3.1 x5.10	7	8
11x17	$16\frac{1}{2}$x17	$16\frac{1}{2}$x34	3.1 x6.2	7	8
11x18	$16\frac{1}{2}$x18	$16\frac{1}{2}$x36	3.1 x6.6	$7\frac{1}{2}$	$8\frac{1}{2}$
12x14	18 x14	18 x28	3.4 x5.2	$6\frac{1}{2}$	$7\frac{1}{2}$
12x15	18 x15	18 x30	3.4 x5.6	7	8
12x16	18 x16	18 x32	3.4 x5.10	$7\frac{1}{2}$	$8\frac{1}{2}$
12x18	18 x18	18 x36	3.4 x6.6		$9\frac{1}{2}$
12x20	18 x20	18 x40	3.4 x7.2		$10\frac{1}{2}$
12x24	18 x24	18 x48	3.4 x8.6		12

One Hank of Sash Cord will hang 16 Weights. Each Hank Measures 75 feet and weighs about 2 1-4 lbs.

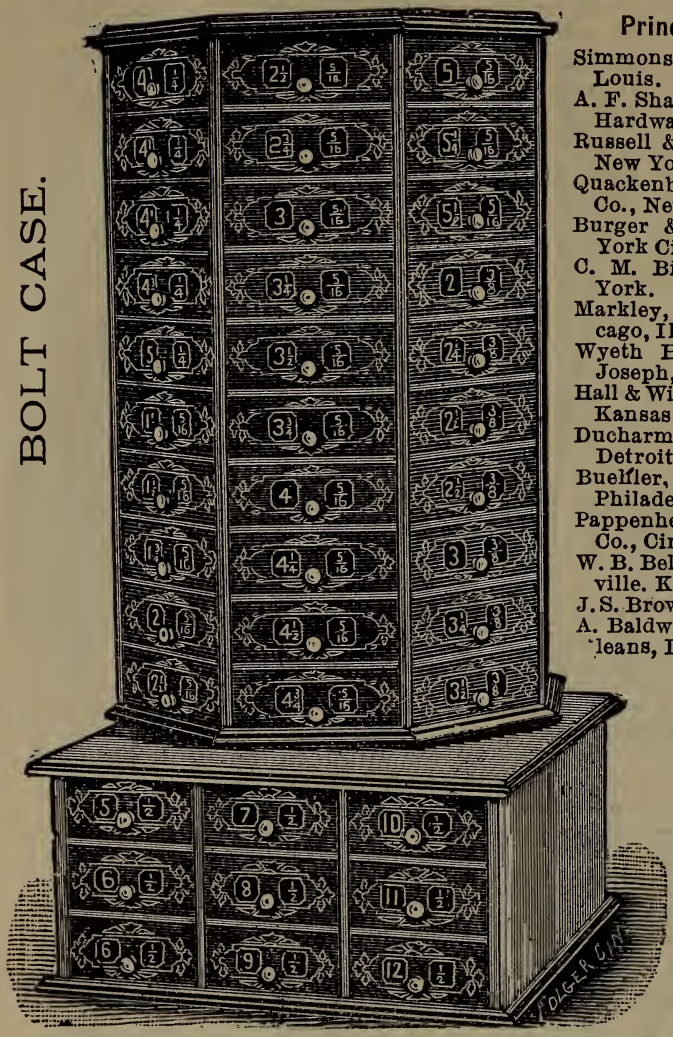
SOLID EYE SASH WEIGHTS.

Length and Thickness of Each Size.

Weight.	Inches in Diam.	Length.	Weight.	Inches in Diam.	Length.	Weight.	Inches in Diam.	Length.
2	$1\frac{1}{2}$	$5\frac{3}{4}$	9	$1\frac{5}{8}$	$18\frac{1}{8}$	18	2	$23\frac{7}{8}$
$2\frac{1}{2}$	$1\frac{1}{2}$	$6\frac{5}{8}$	$9\frac{1}{2}$	$1\frac{5}{8}$	$18\frac{3}{4}$	19	2	$24\frac{7}{8}$
3	$1\frac{1}{2}$	$7\frac{3}{4}$	10	$1\frac{3}{4}$	18	20	2	$25\frac{3}{8}$
$3\frac{1}{2}$	$1\frac{1}{2}$	$9\frac{1}{4}$	$10\frac{1}{2}$	$1\frac{3}{4}$	$18\frac{1}{4}$	21	2	$27\frac{1}{4}$
4	$1\frac{1}{2}$	$10\frac{3}{4}$	11	$1\frac{3}{4}$	$19\frac{1}{4}$	22	2	$27\frac{3}{4}$
$4\frac{1}{2}$	$1\frac{1}{2}$	$11\frac{3}{4}$	$11\frac{1}{2}$	$1\frac{3}{4}$	$20\frac{1}{8}$	23	2	$29\frac{3}{4}$
5	$1\frac{1}{2}$	$12\frac{1}{2}$	12	$1\frac{7}{8}$	$18\frac{3}{8}$	24	2	$31\frac{1}{4}$
$5\frac{1}{2}$	$1\frac{1}{2}$	$13\frac{1}{2}$	$12\frac{1}{2}$	$1\frac{7}{8}$	$19\frac{1}{8}$	25	2	$32\frac{1}{4}$
6	$1\frac{1}{2}$	$14\frac{3}{4}$	13	2	$17\frac{3}{8}$	26	2	$32\frac{7}{8}$
$6\frac{1}{2}$	$1\frac{1}{2}$	$16\frac{3}{8}$	14	2	$19\frac{3}{8}$	27	2	$34\frac{1}{2}$
7	$1\frac{1}{2}$	17	15	2	$20\frac{1}{4}$	28	2	$36\frac{3}{4}$
$7\frac{1}{2}$	$1\frac{1}{2}$	$18\frac{1}{4}$	16	2	$21\frac{1}{2}$	29	2	$38\frac{1}{4}$
8	$1\frac{5}{8}$	$16\frac{3}{4}$	17	2	$22\frac{1}{2}$	30	2	$39\frac{1}{2}$
$8\frac{1}{2}$	$1\frac{5}{8}$	$17\frac{1}{2}$						

AMERICAN
BOLT AND SCREW CASE CO.,
Manufacturers of Patent Revolving Bolt and Screw Cases,
DAYTON, OHIO.

BOLT CASE.



Principal Agents :

Simmons Hardware Co., St. Louis.
A. F. Shapleigh & Cantwell Hardware Co., St. Louis.
Russell & Erwin Mfg. Co., New York.
Quackenbush, Townsend & Co., New York.
Burger & Baumgard, New York City.
C. M. Biddle & Co., New York.
Markley, Alling & Co., Chicago, Ill.
Wyeth Hardware Co., St. Joseph, Mo.
Hall & Willis Hardware Co., Kansas City, Mo.
Ducharme, Fletcher & Co., Detroit, Mich.
Buehler, Bombright & Co., Philadelphia, Pa.
Pappenheimer Hardware Co., Cincinnati, O.
W. B. Belknap & Co., Louisville. Ky.
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Strong, Hackett & Co., St. Paul, Minn.
Wm. Bingham & Co., Cleveland, Ohio.
Lloyd & Supplee Hardware Co. Philadephia, Pa.

THE AMERICAN BOLT & SCREW CASE CO., of Dayton, Ohio, are the only manfacturers of these Cases. Many improvements have been added to them, making them now as perfect and complete, as well as ornamental, as could be desired. They are now using iron standards, screwed firmly into an iron hub, in the bottom, which makes them perfectly true and solid. The tops and bottoms are double, with the grain of the wood crossed, glued and screwed together, and braced with iron rods, which bind the whole firmly together; thus making it strong enough to bear three times the weight that can be put into it; and by which means they revolve perfectly true and easy; and they

ARE GIVING UNIVERSAL SATISFACTION.

Send For Circular. **ALL CASES GUARANTEED.**

ROOFING SLATE.

GENERAL RULE FOR THE COMPUTATION OF SLATE.

From the length of the slate take three inches, or as many as the third covers the first; divide the remainder by 2, and multiply the quotient by the width of the slate, and the product will be the number of square inches in a single slate. Divide the number of square inches thus procured by 144, the number of square inches in a square foot, and the quotient will be the number of feet and inches required. A square of slate is what will cover 100 feet square, when properly laid upon the roof.

TABLE OF SIZES AND NUMBER OF SLATES IN ONE SQUARE.

Size in Inches.	No. of Slate in a Square.	Size in Inches.	No. of Slate in a Square.	Size in Inches.	No. of Slate in a Square.	Size in Inches.	No. of Slate in a Square.
6x12	533	9x14	291	10x18	192	11x22	137
7x12	457	10x14	261	11x18	174	12x22	126
8x12	400	12x14	218	12x18	160	14x22	108
9x12	355	8x16	277	14x18	137	12x24	114
10x12	320	9x16	246	10x20	169	14x24	98
12x12	266	10x16	221	11x20	154	16x24	86
7x14	374	12x16	185	12x20	141	14x26	89
8x14	327	9x18	213	14x20	121	16x26	78

The weight of a square of Slate is estimated in a general way (varying according to the thickness of the different makes) at from 600 to 700 lbs. per square.

A *square* of Slate is 100 superficial feet.

Gauge is distance between the courses of the slates.

Lap is distance which each slate overlaps the slate lengthwise next but one below it, and it varies from 2 to 4 inches. The standard is assumed to be 3 inches.

Margin is width of course exposed or distance between tails of slate.

Pitch of a slate roof should not be less than 1 in height to 4 in breadth.

Length of a slate is taken from nail-hole to tail.

Thickness of slates ranges from $\frac{1}{8}$ to $\frac{5}{16}$ inch.

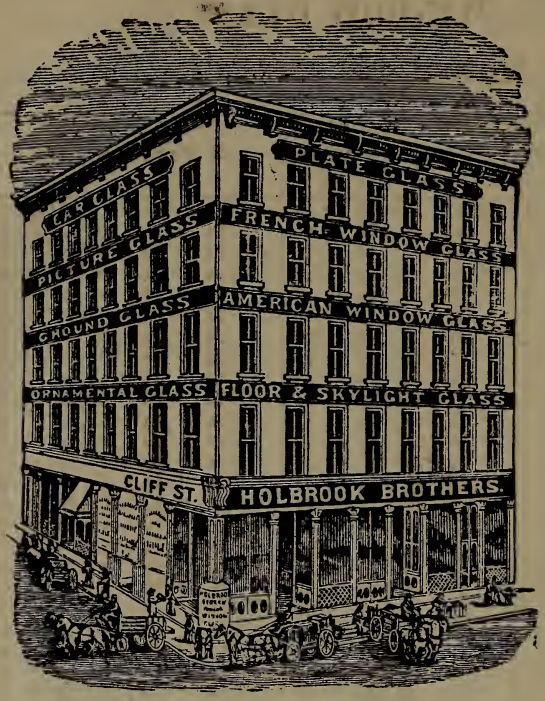
WEIGHT PER SQUARE FOOT.

Thickness.....	$\frac{1}{8}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	1
Weight	1.81	2.71	3.62	5.43	7.25	9.06	10.87	14.5 lbs.

Weight per cubic foot, 174 pounds.

It requires, on account of laps, an average of nearly $2\frac{1}{2}$ *square feet* of slate to make one of slating.

WINDOW GLASS.



IMPORTERS —

ENGLISH and FRENCH PLATE GLASS,
FRENCH WINDOW GLASS.
FRENCH PICTURE GLASS.
FRENCH CAR GLASS.
ENAMELED GLASS,
GROUND GLASS,
CATHEDRAL GLASS.
RUBY, BLUE, GREEN, ORANGE and PURPLE GLASS.

SHARRATT & NEWTH'S ENGLISH GLAZIERS' DIAMONDS.

—ALSO—

American Plate Glass. *American Window Glass.*
Floor and Skylight Glass. *Embossed and Cut Glass.*

All kinds of Glass Cut to any Size and Shape required. Estimates furnished.

HOLBROOK BROTHERS,

87 & 89 Beekman, and 53 & 55 Cliff Streets,

NEW YORK CITY.

WINDOW GLASS.

FRENCH OR AMERICAN.

No. of Lights per Box of 50 Feet.

6	by	8	150	13	by	20	28	16	by	54	8	24	by	30	10	32	by 36	6
6½	"	8½	130	13	"	22	25	16	"	60	8	24	"	32	10	32	" 38	6
7	"	9	115	13	"	24	23	18	"	20	20	24	"	34	9	32	" 40	6
8	"	10	90	13	"	26	21	18	"	20	18	24	"	36	9	32	" 42	6
8½	"	10½	81	13	"	28	20	18	"	24	17	24	"	38	8	32	" 44	5
8	"	11	82	13	"	30	19	18	"	26	16	24	"	40	8	32	" 48	5
8	"	12	75	13	"	32	17	18	"	28	14	24	"	42	7	32	" 50	5
9	"	11	73	14	"	15	34	18	"	30	14	24	"	46	7	32	" 56	4
9	"	12	67	14	"	16	32	18	"	32	13	24	"	48	6	32	" 60	4
9	"	13	62	14	"	17	31	18	"	34	12	24	"	50	6	32	" 66	3
9	"	14	57	14	"	18	29	18	"	36	11	24	"	54	6	34	" 36	6
9	"	15	53	14	"	20	26	18	"	38	11	24	"	56	5	34	" 40	6
9	"	16	50	14	"	22	24	18	"	40	10	24	"	60	5	34	" 44	5
9	"	18	45	14	"	24	22	18	"	42	10	24	"	66	5	34	" 46	5
10	"	12	60	14	"	26	20	18	"	44	9	26	"	28	10	34	" 48	5
10	"	13	55	14	"	28	19	18	"	46	9	26	"	30	9	34	" 50	4
10	"	14	52	14	"	30	17	18	"	50	8	26	"	32	9	34	" 54	4
10	"	15	48	14	"	32	16	18	"	52	8	26	"	34	8	34	" 56	4
10	"	16	45	14	"	34	15	18	"	56	7	26	"	36	8	34	" 60	4
10	"	17	43	14	"	36	14	18	"	60	7	26	"	38	7	34	" 66	3
10	"	18	40	14	"	38	14	20	"	22	16	26	"	42	7	36	" 40	5
10	"	20	36	14	"	40	13	20	"	24	15	26	"	44	6	36	" 44	5
10	"	22	33	14	"	42	12	20	"	26	14	26	"	48	6	36	" 48	4
10	"	24	30	14	"	44	12	20	"	28	13	26	"	50	6	36	" 48	4
10	"	26	28	14	"	46	11	20	"	30	12	26	"	52	5	36	" 50	4
10	"	28	26	15	"	16	30	20	"	32	11	26	"	54	5	36	" 54	4
10	"	30	24	15	"	18	27	20	"	34	11	26	"	58	5	36	" 56	4
11	"	12	55	15	"	20	24	20	"	36	10	26	"	60	5	36	" 60	3
11	"	13	51	15	"	22	22	20	"	38	10	28	"	30	9	36	" 64	3
11	"	14	47	15	"	24	20	20	"	40	9	28	"	32	8	36	" 66	3
11	"	15	44	15	"	26	19	20	"	42	9	28	"	34	8	36	" 70	3
11	"	16	41	15	"	28	17	20	"	44	8	28	"	36	7	38	" 40	5
11	"	17	39	15	"	30	16	20	"	48	8	28	"	40	7	38	" 42	5
11	"	18	37	15	"	32	15	20	"	50	7	28	"	42	6	38	" 44	4
11	"	20	33	15	"	34	14	20	"	54	7	28	"	46	6	38	" 52	4
11	"	22	30	15	"	36	13	20	"	58	6	28	"	50	5	38	" 56	3
11	"	24	27	15	"	38	13	20	"	64	6	28	"	56	5	38	" 62	3
12	"	13	46	15	"	40	12	22	"	24	14	28	"	60	4	38	" 66	3
12	"	14	43	16	"	16	28	22	"	26	13	28	"	66	4	40	" 40	4
12	"	15	40	16	"	18	25	22	"	28	12	30	"	30	8	40	" 42	4
12	"	16	38	16	"	20	23	22	"	30	11	30	"	32	8	40	" 44	4
12	"	17	35	16	"	22	21	22	"	32	10	30	"	34	7	40	" 50	4
12	"	18	34	16	"	24	19	22	"	34	10	30	"	38	7	40	" 54	3
12	"	20	30	16	"	26	17	22	"	36	9	30	"	40	6	40	" 60	3
12	"	22	27	16	"	28	16	22	"	38	9	30	"	44	6	40	" 66	3
12	"	24	25	16	"	30	15	22	"	40	8	30	"	46	5	40	" 72	3
12	"	26	23	16	"	32	14	22	"	42	8	30	"	48	5	42	" 42	4
12	"	28	22	16	"	34	13	22	"	44	7	30	"	50	5	42	" 48	4
12	"	30	20	16	"	36	13	22	"	48	7	30	"	52	5	42	" 52	3
12	"	32	19	16	"	38	12	22	"	50	7	30	"	54	4	42	" 62	3
12	"	34	18	16	"	40	11	22	"	52	6	30	"	56	4	42	" 68	3
12	"	36	17	16	"	42	11	22	"	56	6	30	"	60	4	44	" 46	4
13	"	14	40	16	"	44	10	22	"	60	5	30	"	64	4	44	" 50	3
13	"	15	37	16	"	46	10	24	"	24	12	30	"	66	4	44	" 56	3
13	"	16	35	16	"	48	9	24	"	26	12	30	"	70	3	46	" 54	3
13	"	18	31	16	"	52	9	24	"	28	11	32	"	34	7	46	" 64	3

BRUCE & COOK,

—IMPORTERS OF—

METALS.

TIN PLATE.
Roofing Plate,
Special Sizes,
Block & Bar Tin,
Tinners' Solder.

SHEET IRON.
Russia,
Pat. Planished,
Galvanized,
Double Seaming,
Cold Rolled,
Common.

WIRE.
Bright Iron,
Annealed Fence,
Coppered,
Galvanized,
Tinned.

SOLDER.
Ex. Wiping,
No. 1 Refined,
No. 1 Capping,
Ex. No. 1 "B. & C."
Half and Half.

COPPER.
Sheet, Bottoms,
Solders, Bolts,
Wire, Ingot.

SHEET ZINC.
American,
Spelter.

ELBOWS.
Russia, Planished
Charcoal.

Stove Boards.
Stove Bolts,
" Pipe Collars,
" " Dampers,
Fire Pots,
Rivets, Black,
" Tinned,
Kettle Ears.

SUNDRIES.
Babbit Metal,
Antimony,
Spelter Solder,
Tinsmiths' Tools
and Machines,
Milk Can Trimmings.

AUSTIN'S PATENT EXPANDING CONDUCTOR, AND SPIRAL RIBBED PIPE.

PATENT ROOFING SEAMER FOR PUTTING TIN TOGETHER.

All Latest and Best Machines for Roofers and Tinners.

We call special notice to our Retail Department for those wanting Tinmen's Supplies less than full packages. All orders promptly attended to. Write for prices.

Table of Standard or Regular Tin Plates.

Size and Kind of Plates—Number and Weight of Sheets in a Box, and Wire Gauge Thickness, of every Kind and Size.

Size.	Grade.	Sheets in Box.	Pounds in Box.	Wire Gauge.
10 by 10	IC	225	78	29
"	IX	225	98	27
"	IXX	225	112	26
"	IXXX	225	124	25
"	IXXXX	225	140	24½
10 by 14	IC	225	108	29
"	IX	225	136	27
"	IXX	225	159	26
"	IXXX	225	178	25
"	IXXXX	225	200	24½
10 by 20	IC	225	156	29
"	IX	225	196	27
11 by 11	IC	225	95	29
"	IX	225	118	27
"	IXX	225	135	26
11 by 15	SDC	200	164	26
"	SDX	200	185	25
"	SDXX	200	206	24½
"	SDXXX	200	226	24
"	SDXXXX	200	248	23
22 by 15	SDC	100	164	26
"	SDX	100	185	25
"	SDXX	100	206	24½
"	SDXXX	100	226	24
"	SDXXXX	100	248	23
12½ by 17	DC	100	96	28
"	DX	100	124	26
"	DXX	100	145	24
"	DXXX	100	166	23
"	DXXXX	100	185	22
15 by 21	DX	100	183	27
"	DXX	100	214	24
"	DXXX	100	245	23
"	DXXXX	100	276	22
25 by 17	DC	50	96	28
"	DX	50	124	26
"	DXX	50	145	24
"	DXXX	50	166	23
"	DXXXX	50	185	22
14 by 20	IC	112	108	29
"	IX	112	136	27
"	IXX	112	157	26
"	IXXX	112	178	25
"	IXXXX	112	200	24½
"	IXXXXXX	112	240	23½
12 by 12	IC	225	108	29
"	IX	225	136	27
"	IXX	225	157	26
"	IXXX	225	178	25

Size.	Grade.	Sheets in box.	Pounds in box.	Wire Gauge.
13 by 13	IC	225	130	29
"	IX	225	164	27
"	IXX	225	190	26
"	IXXX	225	216	25
14 by 14	IC	225	152	29
"	IX	225	192	27
"	IXX	225	221	26
"	IXXX	225	250	25
"	IXXXX	225	279	24½
15 by 15	IX	225	221	27
"	IXX	225	255	26
"	IXXX	225	288	25
"	IXXXX	225	322	24½
16 by 16	IC	225	200	29
"	IX	225	252	27
"	IXX	225	290	26
"	IXXX	225	328	25
"	IXXXX	225	368	24½
17 by 17	IX	112	140	27
"	IXX	112	162	26
"	IXXX	112	184	25
"	IXXXX	112	205	24½
18 by 18	IX	112	158	27
"	IXX	112	182	26
"	IXXX	112	206	25
"	IXXXX	112	231	24½
22 by 22	IXX	56	135	26
"	IXXX	56	...	25
"	IXXXX	56	...	24½
24 by 24	IXX	56	157	26
"	IXXX	56	...	25
"	IXXXX	56	...	24½

Terne Plates.

14 by 20	IC	112	108	29
"	IX	112	136	27
20 by 28	IC	112	216	29
"	IX	112	272	27
20 by 200	IC	....	172	29
"	IX	....	216	27

Tin Taggers.

10 by 14		450	108	38

Black Taggers.

10 by 14		256	108	32
"		300	108	34
"		360	108	36
"		450	108	38

From the "Metal Worker."

Cost of Tin Roofing.

The following table shows the cost per square and per square foot of tin roofing, laid with 14x20 tin, with tin at any price from $4 to $10 per box. The first column contains the price per box of tin; the second column shows the cost of tin per square (100 square feet) of surface, and the third column shows the cost of tin per square foot of surface:

FLAT SEAM ROOFING—COST WITH 14x20 TIN.

Price of tin per box.	Cost per square of flat roof 14x20 tin.	Cost per sq. foot.	Price of tin per box.	Cost per square of flat roof 14x20 tin.	Cost per sq. foot.
$4.25	$2.21	.0221	$8.25	$4.29	.0429
4.50	2.34	.0234	8.50	4.42	.0442
4.75	2.47	.0247	8.75	4.55	.0455
5.00	2.60	.0260	9.00	4.68	.0468
5.25	2.73	.0273	9.25	4.81	.0481
5.50	2.86	.0286	9.50	4.94	.0494
5.75	2.99	.0299	9.75	5.07	.0507
6.00	3.12	.0312	10.00	5.20	.0520
6.25	3.25	.0325	10.25	5.33	.0533
6.50	3.38	.0338	10.50	5.46	.0546
6.75	3.51	.0351	10.75	5.59	.0559
7.00	3.64	.0364	11.00	5.72	.0572
7.25	3.77	.0377	11.25	5.85	.0585
7.50	3.90	.0390	11.50	5.98	.0598
7.75	4.03	.0403	11.75	6.11	.0611
8.00	4.16	.0416	12 00	6.24	.0624

STANDING SEAM ROOFING—COST WITH 14x20 TIN.

Price of tin per box.	Cost per square of standing seam roof with 14x20 tin.	Cost per sq. foot.	Price of tin per box.	Cost per square of standing seam roof with 14x20 tin.	Cost per sq. foot.
$4.25	$2.37	.0237	$7.25	$4.03	.0403
4.50	2.51	.0251	7.50	4.17	.0417
4.75	2.65	.0265	7.75	4.31	.0431
5.00	2.79	.0279	8.00	4.45	.0445
5.25	2.93	.0293	8.25	4.59	.0459
5.50	3.06	.0306	8.50	4.73	.0473
5.75	3.20	.0320	8.75	4.87	.0487
6.00	3.34	.0334	9.00	5.01	.0501
6.25	3.48	.0348	9.25	5.15	.0515
6.50	3.62	.0362	9.50	5.29	.0529
6.75	3.76	.0376	9.75	5.43	.0543
7.00	3.90	.0390	10.00	5.57	.0557

Cost of Tin Roofing—Continued.

The following table shows the cost per square and per square foot of tin roofing, laid with 20x28 tin, with tin at any price from $8 to $24 per box. The first column contains the price per box of tin; the second column shows the cost of tin per square (100 square feet) of surface, and the third column shows the cost of tin per square foot of surface.

FLAT SEAM ROOFING—COST WITH 20x28 TIN.

Price of tin per box.	Cost per square of flat seam roof 20x28 tin.	Cost per sq. foot.	Price of tin per box.	Cost per square of flat seam roof 20x28 tin.	Cost per sq. foot.
$8.00	$2.01	.0201	$16.00	$4.01	.0401
8.50	2.13	.0213	16.50	4.13	.0413
9.00	2.26	.0226	17.00	4.26	.0426
9.50	2.38	.0238	17.50	4.38	.0438
10.00	2.51	.0251	18.00	4.51	.0451
10.50	2.63	.0263	18.50	4.63	.0463
11.00	2.76	.0276	19.00	4.76	.0476
11.50	2.88	.0288	19.50	4.88	.0488
12.00	3.00	.0300	20.00	5.01	.0501
12.50	3.13	.0313	20.50	5.13	.0513
13.00	3.25	.0325	21.00	5.26	.0526
13.50	3.38	.0338	21.50	5.38	.0538
14.00	3.50	.0350	22.00	5.51	.0551
14.50	3.63	.0363	22.50	5.63	.0563
15.00	3.75	.0375	23.00	5.76	.0576
15.50	3.88	0388			

STANDING SEAM ROOFING—COST WITH 20x28 TIN.

Price of tin per box.	Cost per square of standing seam roof with 20x28 tin.	Cost per sq. foot.	Price of tin per box.	Cost per square of standing seam roof with 20x28 tin.	Cost per sq. foot.
$8.00	$2.15	.0215	$16.50	$4.42	.0442
8.50	2.28	.0228	17.00	4.56	.0456
9.00	2.41	.0241	17.50	4.69	.0469
9.50	2.55	.0255	18.00	4.82	.0482
10.00	2.68	.0268	18.50	4.96	.0496
10.50	2.82	.0282	19.00	5.09	.0509
11.00	2.95	.0295	19.50	5.23	0523
11.50	3.09	.0309	20.00	5.36	.0536
12.00	3.21	.0321	20.50	5.49	.0549
12.50	3.35	.0335	21.00	5.63	.0563
13 00	3.48	.0348	21.50	5.76	.0576
13.50	3.62	.0362	22.00	5.90	.0590
14.00	3.75	.0375	22.50	6.03	.0603
14.50	3.89	.0389	23.00	6.17	.0617
15.00	4.02	.0402	23.50	6.30	.0630
15.50	4.15	.0415	24.00	6.43	.0643
16.00	4.29	.0429			

THE CARVER'S FRIEND.

SOLID EMERY KNIFE-SHARPENER.

Acknowledged by everyone to be

The Very Best Article of its Kind in Use To-Day.

A FEW STROKES WILL GIVE THE DULLEST KNIFE A KEEN EDGE, WHICH EVERY HOUSEKEEPER WILL APPRECIATE.

HANDY FOR THE TABLE OR KITCHEN USE.

Made of the Best Turkish Emery, with a steel wire in the centre, and will LAST FOR YEARS.
The Discount to the Trade is LIBERAL.
Sample sent on receipt of price.

For a Fine Cocobola Handle, 85c.; or with Applewood Handle, 60c.

For sale by Jobbers generally throughout the United States. Mention this Book.

W. H. PARKIN,

11 South Water Street, - CLEVELAND, O.

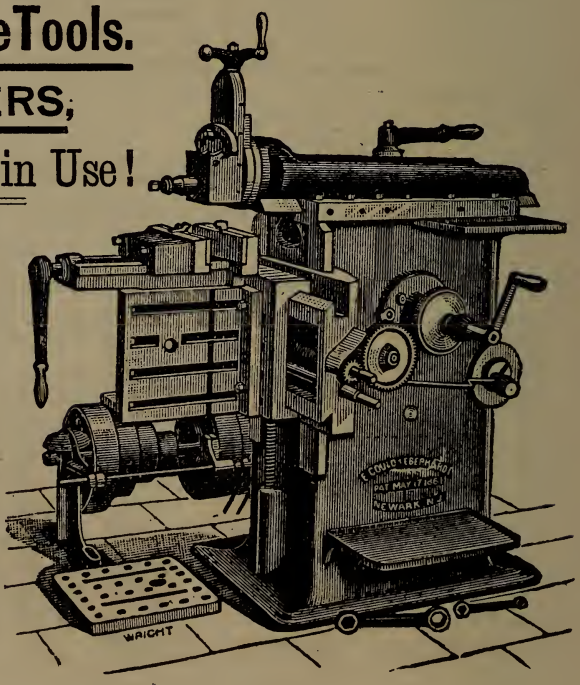
GOULD & EBERHARDT,

Newark, N. J.

irst-Class **Machine Tools.**

Patent **SHAPERS,**

Over 1000 in Use!



EBERHARDT'S PATENT

DRILLS

Experts Pronounce them the

BEST.

Automatic GEAR-CUTTERS

Automatic RACK-CUTTERS

Automatic DIAL-PRESSES

TOOL-GRINDERS, PLANERS, LATHES.

RECIPES FOR SOLDERS.

SOFT SOLDERS.

Among the soft solders to be employed with metals melting at a low temperature, we give the following:

Solder for bright tin ware, etc.: "Half & Half."

Tin	50 parts.
Lead	50 "

Solder for roofing, and plumbing joints: "No. 1."

Tin	40 parts.
Lead	60 "

Solder for galvanized ware, etc.: "No. 1. Extra."

Tin	45 parts.
Lead	55 "

Solder for pewter:

Tin	100 parts.
Lead	200 "

Solder for sealing iron in stone:

Lead	200 parts.
Zinc	100 "

This alloy is more resisting and adheres better than pure lead.

Solders for obtaining casts of medals, coins, etc.:

Bismuth	400 or 600
Lead	200 " 200
Tin	200 " 300

This alloy melts between 212 F. (or at water-boiling point) and becomes very liquid.

HARD SOLDERS.

Above we give the alloys of all soft solders. Herewith we give the constituents and process of making the harder ones:

Solder for iron:

Copper	67
Zinc	33

Solder for pure copper or ordinary brass:

Copper	3
Zinc	1

Solder for hard brass:

Scraps of metal to be soldered	4
Zinc	1

Hard solder for small and thin pieces:

Copper	86.5
Zinc	4.5

Solder for uniting brass tube seams:

Copper... 70	Brass	77.5
Tin..... 30	Zinc	22.5

The proper process of making these solders is as follows: The copper and zinc are melted in separate crucibles, then added together in a pouring-pot and thoroughly mixed, and when at the proper temperature is poured from a certain height upon a bundle of birch twigs, kept wet and agitated at the surface of a tub of water. The solder is thus obtained in the shape of fine grains, having an irregular crystallization. When solder is not sufficiently fine it is hammered in a cast-iron mortar and passed through a sieve.

STOVE BOARDS.

The THREE BEST that can be Made.

Wood-Lined and Paper-Lined.

THE "DAISY"

IS MADE OF EMBOSSED WHITE METAL,
PERFECT IN MAKE AND FINISH,
BEAUTIFUL AND DURABLE.

THE "NEW TACOMA"

IS AN EMBOSSED METAL BOARD,
FIRE-PROOF AND BRASS-FINISHED.

THE "FAVORITE"

Is the Best **ZINC** *Board Made.*
Oil-Finished and a Durable Silver Polish.
Prices Reasonable. Send for Price-Lists and Discounts.
Sold by Jobbers in all of the Large Towns.

MADE ONLY BY

A. I. GRIGGS,

211 WATER STREET, - NEW YORK.

P. S.—He makes a metal "Slop-Jar Mat" that should be under every slop-jar now in use.

Table of Weights of Sheet Copper per Square Foot, and Thickness per English Wire Gauge.

English Wire Gauge.	Weight per square foot.		Weight of each sheet.				
			14x48	24x48	30x60	26x72	48x72
	lbs.	oz.	lbs.	lbs.	lbs.	lbs.	lbs.
No. 1	14	8	.....	116	181	261	348
2	13	14	.....	111	174	250	334
3	12	12	.....	102	159	230	306
4	11	9	.....	93	145	209	278
5	10	1	.....	81	126	182	242
6	9	6	.....	75	118	169	226
7	8	11	.....	70	109	157	209
8	7	14	.....	63	99	142	190
9	7	3	.....	58	90	130	173
10	6	8	.....	48	81	117	156
11	5	12	.....	46	73	104	139
12	5	1	.....	41	64	91	122
13	4	5	.....	35	54	78	104
14	3	9	.....	29	45	65	86
15	3	4	.....	26	41	59	78
16	2	14	.....	23	36	52	70
17	2	8	.....	20	32	45	60
18	2	2	.....	18	27	39	52
19	1	15	.....	16	24	35	47
20	1	12	.....	14	22	32	43
21	1	9	.....	13	20	29	39
22		22	6½	12	18	26	35
23		20	5⅞	10	16	23	31
24		18	5¼	9	15	21	28
25		16	4⅝	8	12½	19	25
26		14	4	7	11	15	21
27		12	3½	6	9⅜	13	18
28		10	3	5	7	11	15

Stubbs' Wire Gauge in Inches.

No. 1	5-16 in.	No. 11	1-8 in.
" 3	1-4 "	" 16	1-16 "
" 7	3-16 "	" 21	1-32 "

Rules to be Observed in Ordering Metal or Wire.

All Metal is numbered according to Brown & Sharpe's U. S. Standard Gauge, which is known as "The New Gauge."

All Wire is numbered according to Stubs' English Wire Gauge, which is known as one of the "Old Gauges," to No. 25 inclusive; No. 26 and finer by London Gauge.

Parties ordering Metal or Wire will please make their orders to conform to above Gauges. All orders where the name of Gauge is not stated, will be filled as above. In case parties ordering Metal or Wire have no Gauge, a small piece of either material may be sent, which will answer for the Number.

For difference in Gauges see comparative table

In ordering Metal always state width and temper wanted.

In ordering Wire always state whether Hard, Soft or Spring Wire is wanted.

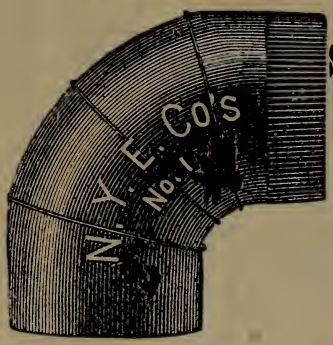
The term "High" Brass refers to color, and not to temper.

The Trade's Favorite Still Ahead!

THE NEW YORK ELBOW COMPANY,

MANUFACTURERS OF

SHEET METAL ELBOWS



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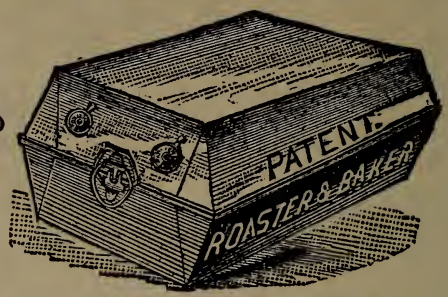


THE EMPIRE ROASTER AND BAKER,

18 Cliff St., New York.

117 N. 2d ST. PHILADELPHIA.

☞The name and reputation which has been attained by *Our Superior Make of Goods* is owing to the fact that we are the only manufacturers who have made Elbows exclusively from Best Refined and Russia Iron.

All ELBOWS of
Our Manufacture

NEW YORK ELBOW CO.
NEW YORK
PHILADA
TRADE MARK
REGISTERED.

Bear Red Label. "None Genuine Without It."

☞They are recognized by the trade as being the *Leading* and only *Standard Elbows* in the market. Beware of worthless imitations made from thin Boiled Iron and with loose, flimsy joints.

Send for Price-List and Sample Dozen.

ASK YOUR JOBBER FOR

NEW YORK ELBOW COMPANY'S ELBOWS.

Bar and Sheet Brass.

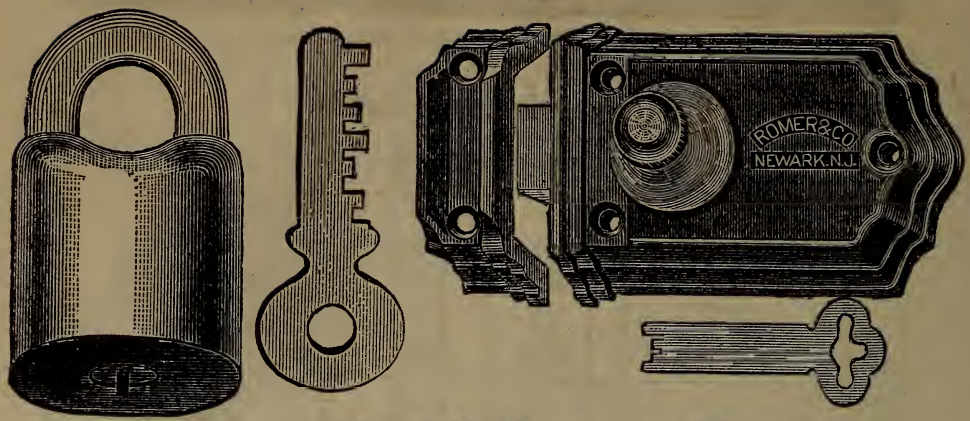
WEIGHT IN POUNDS.

Thickness, or Diameter, or Size; Inches.	Sheets per Square Foot.	Square Bars 1 Foot Long.	Round Bars 1 Foot Long.	Thickness, or Diameter, or Size; Inches.	Sheets per Square Foot.	Square Bars 1 Foot Long.	Round Bars 1 Foot Long.
1-16	2.7	.015	.011	1 1-16	45.95	4.07	3.20
⅛	5.41	.055	.045	⅛	49.69	4.55	3.57
3-16	8.12	.125	.1	3-16	51.4	5.08	3.97
¼	10.76	.225	.175	¼	54.18	5.65	4.41
5-16	13.47	.350	.275	5-16	56.85	6.22	4.86
⅜	16.25	.51	.395	⅜	59.55	6.31	5.35
7-16	19.	.69	.54	7-16	62.25	7.45	5.85
½	21.65	.905	.71	½	65.	8.13	6.37
9-16	24.3	1.15	.9	9-16	57.75	8.83	6.92
⅝	27.12	1.4	1.1	⅝	70.35	9.55	7.48
11-16	29.77	1.72	1.35	11-16	73.	10.27	8.05
¾	32.46	2.05	1.60	¾	75.86	11.	8.65
13-16	35.18	2.4	1.85	13-16	78.52	11.82	9.29
⅞	37.85	2.75	2.15	⅞	71.25	72.68	9.95
15-16	40.55	3.15	2.48	15-16	84.	13.5	10.58
1	43.29	3.65	2.85	2	86.75	14.35	11.25

Bar and Sheet Copper.

Weight in Pounds.

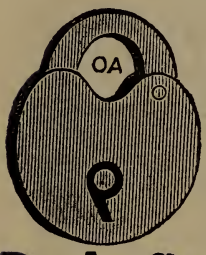
Thickness, or Diameter, or Size; Inches.	Sheets per Square Foot.	Square Bars 1 Foot Long.	Round Bars 1 Foot Long.	Thickness, or Diameter, or Size; Inches.	Sheets per Square Foot.	Square Bars 1 Foot Long.	Round Bars 1 Foot Long.
1-16	2.88	.015	.011	1 1-16	49.	4.35	3 41
⅛	5.75	.06	.056	⅛	52.	4.83	3 85
3-16	8.65	.134	.105	3-16	54 9	5.40	4.29
¼	11.48	.235	.187	¼	57 65	6.	4.73
5-16	14.36	.375	.295	5-16	60.5	6.60	5.20
⅜	17.28	.54	.424	⅜	53.45	7.27	5.70
7-16	20.19	.735	.575	7-16	66.35	7.90	6 28
½	23.1	.960	.75	½	69.3	8.64	6.80
9-16	26.	1.21	.95	9-16	72.15	9 28	7.30
⅝	28.85	1.51	1 17	⅝	75.1	10.15	8.
11-16	31.68	1.81	1.42	11-16	77 95	10.95	8.6
¾	34.57	2.15	1 7	¾	80.75	11.70	9.24
13-16	36.46	2.54	2.	13-16	83 60	12.60	9.85
⅞	40.39	2.95	2.3	⅞	86.58	13.46	10.55
15-16	43.27	3.37	2.64	15-16	09.45	14.35	11.25
1	46.15	3.84	3.01	2	92.25	15.35	12.



ROMER & CO.,

Manufacturers of

Patent Jail Locks,
Brass and Iron Padlocks,
R. R. Car and Switch Locks,



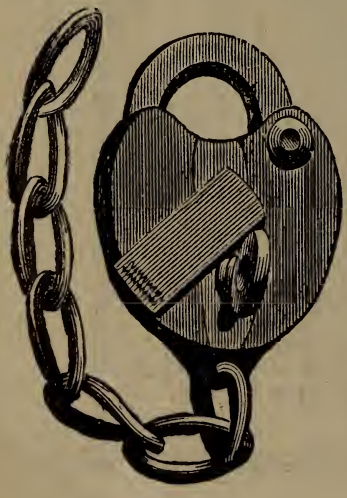
PATENT REVERSIBLE NIGHT LATCHES,

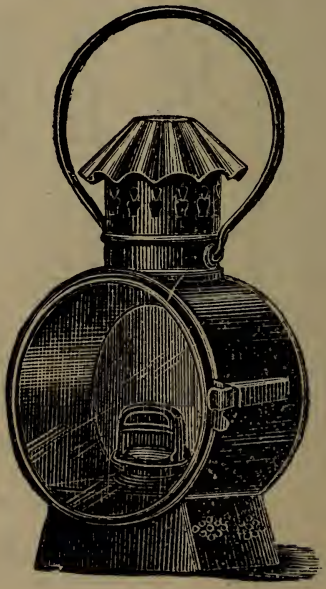
Also Conductors' HAND and SIGNAL

LANTERNS,

Dash, Carriage and Bicycle Lamps, Etc.

Illustrated Catalogue sent to the Trade on Application.





Romer & Co.

28 to 42

SUMMER AVE.,

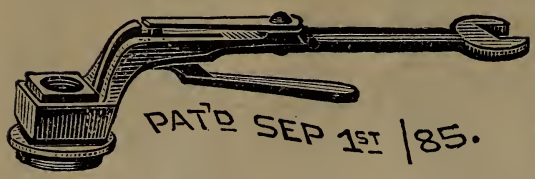
Newark, N. J.

Weight of Iron, Steel, Copper and Brass Plates.

DIAMETER AND THICKNESS DETERMINED BY AMERICAN GAUGE.

No. of Gauge.	Size of each No.	Weight of Plates per Square Foot.			
		Wrought Iron.	Steel.	Copper.	Brass.
	Inch.	Lbs.	Lbs.	Lbs.	Lbs.
0000	.46000	17.25	17.48	20.838	19.688
000	.40964	15.3615	15.5663	18.557	17.533
00	.36480	13.68	13.8624	16.525	15.613
0	.32486	12.1823	12.3447	14.716	13.904
1	.28930	10.8488	10.9934	13.105	12.382
2	.25763	9.6611	9.7899	11.671	11.027
3	22942	8.6033	8.7180	10.393	9.8192
4	.20431	7.6616	7.7638	9.2552	8.7445
5	.18194	6.8228	6.9137	8.2419	7.787
6	.16202	6.0758	6.1568	7.3395	6.9345
7	.14428	5.4105	5.4826	6.5359	6.1752
8	.12849	4.8184	4 8826	5.8206	5.4994
9	.11443	4.2911	4.3483	5.1837	4.8976
10	.10189	3.8209	3.8718	4.6156	4.3609
11	.090742	3.4028	3.4482	4.1106	3.8838
12	.080808	3.0303	3.0707	3.6606	3.4586
13	.071961	2.6985	2.7345	3.2598	3.0799
14	.064084	2.4032	2.4352	2.9030	2.7428
15	.057068	2.1401	2.1686	2.5852	2.4425
16	.050820	1.9058	1.9312	2.3021	2.1751
17	.045257	1.6971	1.7198	2.0501	1.937
18	.040303	1.5114	1.5315	1.8257	1.725
19	.035890	1.3459	1.3638	1.6258	1.5361
20	.031961	1.1985	1.2145	1.4478	1.3679
21	.028462	1.0673	1.0816	1.2893	1.2182
22	.025347	.95051	.96319	1.1482	1.0849
23	.022571	.84641	.8577	1.0225	.96604
24	.020100	.75375	.7638	.91053	.86028
25	.017900	.67125	.6802	.81087	.76612
26	.01594	.59775	.60572	.72208	.68223
27	.014195	.53231	.53941	.64303	.60755
28	.012641	.47404	.48036	.57264	.54103
29	.011257	.42214	.42777	.50994	.48180
30	.010025	.37594	.38095	.45413	.42907
31	.008928	.3348	.33926	.40444	.38212
32	.007950	.29813	.3021	.36014	.34026
33	.007080	.2655	.26904	.32072	.30302
34	.006304	.2364	23955	.28557	.26981
35	.005614	.21053	.21333	.25431	.24028
36	.005000	.1875	.19	.2265	.2140
37	.004453	.16699	.16921	.20172	.19059
38	.003965	.14869	.15067	.17961	.1697
39	.003531	.13241	13418	.15995	.15113
40	.003144	.1179	.11947	.14242	.13456
Specific Grav.....		7.200	7.296	8.698	8.218
Weight per Cubic Foot..		450.	456.	543.6	513.6

Indispensable to Everyone Owning a Carriage.



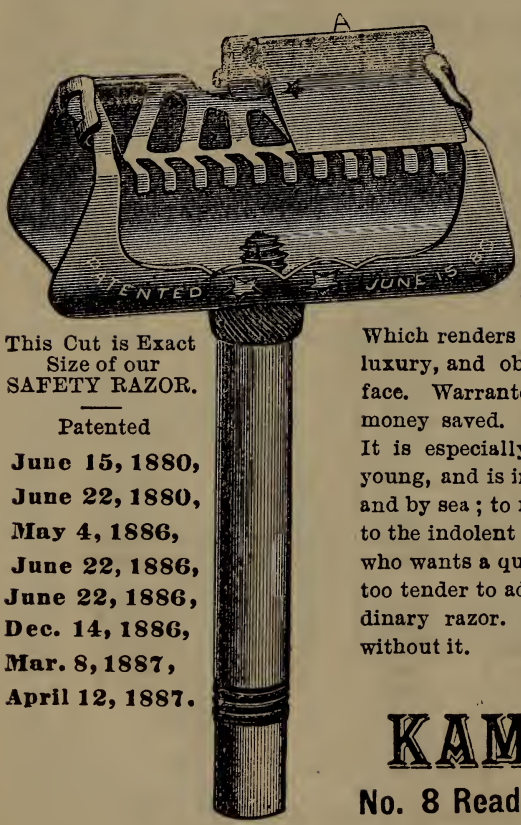
COOK'S Patent Carriage Wrench

The above cut represents the Best CARRIAGE WRENCH that has ever been placed upon the market. The nut is firmly held in the Wrench by a spring (instantly applied and released), thus preventing its falling to the ground, and also the hands from getting greasy while removing from or attaching to axle. It is strongly made of malleable iron, well finished and in three sizes, $\frac{7}{8}$-in., 1-in., $1\frac{1}{8}$-in. Merchants will find this a very salable wrench. A sample dozen, assorted sizes, will be *Sent by Express to any address* on receipt of **$2.00,**

or one Wrench by Mail on receipt of **36c.**

R. B. THOMAS, Sole Agent,

NO. 90 CHAMBERS ST., - NEW YORK.



This Cut is Exact Size of our SAFETY RAZOR.

Patented

June 15, 1880,
June 22, 1880,
May 4, 1886,
June 22, 1886,
June 22, 1886,
Dec. 14, 1886,
Mar. 8, 1887,
April 12, 1887.

THE STAR Safety Razor

The Medal of Superiority awarded at American Institute, 1884-5-6; and also, a Silver Medal awarded at Mechanics' Institute, San Francisco, Cal., 1886.

A Great Invention

Which renders shaving an easy and convenient luxury, and obviates all danger of cutting the face. Warranted to shave clean. Time and money saved. Delays in barber shops avoided. It is especially adapted to the aged and to the young, and is indispensable to travelers by land and by sea; to miners and persons camping out; to the indolent and the luxurious; to the man who wants a quick shave, and him whose skin is too tender to admit of the application of the ordinary razor. Once used you will never be without it.

KAMPFE BROS.,

No. 8 Reade St., - New York.

RULES FOR COMPUTING WEIGHTS OF METALS.

I.—CAST IRON.

To find the weight of a cast-iron rod or bar: multiply the weight of a wrought rod or bar from the usual tables, and deduct 2.27 of its weight.

II.—WROUGHT IRON.

To compute the weight of any piece of wrought iron: find the number of cubic inches it contains and multiply by .2816. This will give the weight in pounds.

III.—CAST IRON.

Multiply the number of cubic inches by .2607.

IV.—COPPER.

To compute the weight of copper: ascertain the number of cubic inches, and multiply by .3242.

V.—LEAD.

To compute the weight of lead: multiply the number of cubic inches by .41015.

VI.—BRASS.

To compute the weight of brass: multiply the number of cubic inches by .3112.

USEFUL MATHEMATICAL RULES.

To find the area of a parallelogram: multiply the length by the breadth.

To find the circumference of a circle: multiply the diameter by 3.14159.

To find the diameter of a circle: multiply the circumference by .31831.

To find the area of a circle: multiply the square of the diameter by .7854; or, multiply the square of the circumference by .079577; or, multiply half the diameter by half the circumference.

To find the area of a circular ring: multiply the sum of the diameters of the two circles by the difference of the diameters, and that product by .7854.

To find the side of a square that shall equal the area of a given diameter or circumference: multiply the diameter of the circle by .886227; or, multiply the circumference of the circle by .282094.

To find the diameter of a circle that shall contain the area of a given square: multiply the side of the given square by 1.12838.

To find the side of the largest square that can be inscribed in a circle of a given diameter or circumference: multiply the given diameter by .707106; or, multiply the given circumference by .225079.

To find the circumference of a circle required to exactly admit a square of a given side: multiply the given side by .225079.

IRON CLAD MANUFACTURING CO.

Largest Manufacturers of

GALVANIZED SHEET-IRON GOODS

IN THE UNITED STATES.

Such as

COAL HODS, ASH CANS,

Water and Fire Buckets,

Galvanized Iron Sprinklers,

Refrigerator or Drip Pans,

WELL BUCKETS, OIL TANKS, ETC.

Also Manufacturers of the Justly-Celebrated

Iron Clad Milk Cans,

In New York, Philadelphia, Cincinnati, Baltimore, Chicago, Boston and St. Louis patterns.

GALVANIZED-IRON RANGE BOILERS,

FRY-PANS, RIVETS, ETC.

IRON CLAD MANUFACTURING CO.,

22 CLIFF ST., NEW YORK.

[From "The Metal Worker."]

GALVANIZED SHEET IRON.

TABLE, Showing Gauges, with Weights per Square Foot; List Price per Pound; Cost per Square Foot at List, together with Cost per Pound and per Square Foot at Different Discounts, ranging from 25 per cent. to 55 per cent.

In this Table prices are calculated to three places of decimals, which is sufficiently accurate for all practical purposes.

Gauge Number		20	21	22	23	24	25	26	27	28
Weight per square foot, oz		28	24	21	19	17	16	15	14	13
List price per pound		.12	.13	.13	.13	.13	.14	.14	.15	.16
Cost per square foot at List		.21	.195	.171	.154	.138	.14	.131	.131	.13
Cost 25 per cent. Discount	per lb	.09	.098	.098	.098	.098	.105	.105	113	.12
	per square foot	.158	.146	.128	.116	.104	.105	.098	.098	.098
" 27½ " "	per lb	.087	.094	.094	.094	.094	.102	.102	.109	.116
	per square foot	.152	.141	.124	.112	.10	.102	.095	.095	.094
" 30 " "	per lb	.084	.091	.091	.091	.091	.098	.098	.105	.112
	per square foot	.147	.137	.119	.108	.097	.098	.092	.092	.091
" 32½ " "	per lb	.081	.088	.088	.0 8	.088	.095	.095	.101	.108
	per square foot	.142	.132	.115	.104	.093	.095	.089	.089	.088
" 33⅓ " "	per lb	.08	.087	.087	.087	.087	.093	.093	.10	.107
	per square foot	.14	.13	.114	.103	.092	.093	.088	.088	.087
" 35 " "	per lb	.078	.085	.085	.085	.085	.091	.091	.098	.104
	per square foot	.137	.127	.111	.10	.09	.091	.085	.085	.085
" 37½ " "	per lb	.075	.081	.081	.081	.081	.088	.088	.094	.10
	per square foot	.131	.122	.107	.096	.086	.088	.082	.082	.081
" 40 " "	per lb	.072	.078	.078	.078	.078	.084	.084	.09	.096
	per square foot	.126	.117	.102	.093	.083	.084	.079	.079	.078
" 42½ " "	per lb	.069	.075	.075	.075	.075	.081	.081	.086	.092
	per square foot	.121	.112	.098	.089	.079	.081	.075	.075	.075
" 45 " "	per lb	.066	.072	.072	.072	.072	.077	.077	.083	.088
	per square foot	.116	.107	.094	.085	.076	.077	.072	.072	.072
" 47½ " "	per lb	.063	.068	.063	.068	.068	.074	.074	.079	.084
	per square foot	.11	.102	.09	.081	.073	.074	.069	.069	.068
" 50 " "	per lb	.06	.065	.065	.065	.065	.07	.07	.075	.08
	per square foot	.105	.098	085	.077	.069	.07	.066	.066	.065
" 52½ " "	per lb	.057	.062	.062	.062	.062	.067	.067	.071	.076
	per square foot	.10	.093	.081	.073	.066	.067	.062	.062	.062
" 55 " "	per lb	.054	.059	.059	.059	.059	.063	.063	.068	.072
	per square foot	.095	.088	.077	.060	.062	.063	.059	.059	.059

RUSSIA SHEET IRON.

	Size.	Weight per Sheet.	Wire Gauge.
No. 7.....	28x56 in.	6¼ lbs.	No. 29
" 8.....	"	7¼ "	" 28
" 9.....	"	8 "	" 27
" 10.....	"	9 "	" 26
" 11.....	"	10 "	" 25
" 12.....	"	10¾ "	" 24½
" 13.....	"	11¾ "	" 24
" 14.....	"	12½ "	" 23¼
" 15.....	"	13½ "	" 22⅝
" 16.....	"	14½ "	" 21½

SHEET ZINC.

Zinc Gauge.	Stubs' Wire Gauge.	Weight per sq. foot.	Approximate Weight per sheet.							
			24 x 84	26 x 84	28 x 84	30 x 84	32 x 84	34 x 84	36 x 84	40 x 84
		oz.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
6	29	7	6⅛	6⅝	7⅛	7⅝	8¼	8¾	9¼	
7	28½	8	7	7⅝	8⅛	8¾	9⅜	9⅛	10½	
8	28	9	7⅞	8½	9¼	9⅞	10½	11⅛	11¾	
9	27	10½	9¼	10	10¾	11½	12¼	13	13⅜	
10	26	12	10½	11½	12	13	14	15	16	
11	25	13½	12	13	14	15	16	17	18	
12	24	15	13	14	15	16½	17½	18½	20	
13	23	17	15	16	17	18½	20	21	22	25
14	22	19	17	18	19½	21	22	23½	25	28
15	21	22	19	21	22½	24	25½	27	29	32
16	20	25	22	24	25½	27	29	31	33	36
17	19	28	25	27	29	31	33	35	37	41
18	18	31	27	30½	32	34	36	38	41	45
19	17	35	31	33	36	38	41	44	46	51
20	16	40	35	38	41	44	47	50	53	59

SHEET LEAD

IS MADE TO WEIGH, PER SQUARE FOOT:

2½. 3, 3½ 4, 4½, 5, 6, 7, 8, 9, 10 pounds, and upwards.

STANDARD WEIGHTS OF LEAD PIPE, Etc.

WEIGHT PER FOOT OF LEAD PIPE AND TIN-LINED LEAD PIPE.

Calibre	AAA Brooklyn.		AA Ex Strong		A Strong.		B Medium.		C Light.		D Ex Light.		E Fountain.	
	Lb.	Oz.	Lb.	Oz.	Lb.	Oz.	Lb.	Oz.	Lb.	Oz	Lb.	Oz.	Lb.	Oz.
⅜	1	8	1	5	1	2	1	0	0	13	0	10	0	8
½	3	0	2	0	1	12	1	4	1	0	0	13	0	11
⅝	3	8	2	12	2	8	2	0	1	12	1	8	1	0
¾	4	8	3	8	3	0	2	4	2	0	1	12	1	4
1	6	0	4	12	4	0	3	4	2	8	2	0	1	8
1¼	6	12	5	12	4	12	3	12	3	0	2	8	2	0
1½	9	0	8	0	6	4	5	0	4	4	3	8	3	4
2	10	12	9	0	7	0	6	0	5	4	4	0		

LEAD WASTE PIPE.

1½ inch, 2 lbs.....per foot.
2 " 3 lbs..... "
2½ " 4 and 6 lbs.... "
3 " 3½, 4½ & 5 lbs. "
4 inch, 4½, 5, 6 & 8 lbs...per foot.
4½ inch, 6, 6¾ & 8 lbs... "
5 inch, 8, 10 & 12 lbs.... "
6 " 9¾ and upwards.. "

EXTRA WEIGHTS OF LEAD PIPE.

Calibre.	7-16 Thick.		⅜ Thick.		5-16 Thick.		¼ Thick.		3-16 Thick.	
	Lb.	Oz.	Lb.	Oz.	Lb.	Oz.	Lb.	Oz.	Lb.	Oz.
2½ inches..	0	0	16	11	13	11	11	0	7	13
3 " ..	0	0	19	10	16	0	12	0	9	0
3½ " ..	26	10	21	10	18	5	15	0	9	8
4 " ..	30	0	25	0	21	0	16	0	12	8
4½ " ..	0	0	0	0	0	0	18	0	14	0
5 " ..	0	0	31	0	0	0	20	0	0	0

PATENT FINISH DROP SHOT.

AMERICAN STANDARD SIZES.

	Diameter in 100ths of an inch.	No. of Shot to the oz.
Extra Fine Dust..	1½	84021
Fine Dust.....	3	10784
Dust	4	4565
No. 12.....	5	2326
" 11.....	6	1346
" 10.....Trap Shot		1056
" 10.....	7	848
" 9.....Trap Shot		688
" 9.....	8	568
" 8.....Trap Shot		472
" 8.....	9	399
" 7.....Trap Shot		338
" 7.....	10	291
No. 6.....	11	218
" 5.....	12	168
" 4.....	13	132
" 3.....	14	106
" 2.....	15	86
" 1.....	16	71
" B.....	17	59
" BB.....	18	50
" BBB	19	42
" T.....	20	36
" TT.....	21	31
" F.....	22	27
" FF.....	23	24

COMPRESSED BUCK SHOT.

	Diameter in 100ths of an inch.	No. of Balls to the lb.
No. 3.....	25	284
" 2.....	27	232
" 1.....	30	173
" 0.....	32	140
No. 00.....	34	115
" 000.....	36	98
Balls.....	38	85
"	44	50

Weight and Dimensions of Wrought Iron Welded Pipes.

FOR GAS, STEAM AND WATER.

Inside Diameter in inches.	Outside Diameter in inches.	Weight per foot in pounds.	Inside Diameter in inches.	Outside Diameter in inches.	Weight per foot in pounds.
⅛	0.40	0.24	3	3.5	7.54
¼	0.54	0.42	3½	4.0	9.05
⅜	0.67	0.56	4	4.5	10.72
½	0.84	0.85	4½	5.0	12.49
¾	1.05	1.12	5	5.56	14.56
1	1.31	1.67	6	6.62	18.77
1¼	1.66	2.25	7	7.62	23.41
1½	1.95	2.69	8	8.62	28.35
2	2.37	3.66	9	9.68	34.07
2½	2.87	5.77	10	10 75	40.64

Lap Welded American Charcoal Iron Boiler Tubes.

TABLE OF STANDARD SIZES.

External Diameter.	External Circumference.	Internal Diameter.	Internal Circumference.	Thickness.	Length of Pipe per sq. ft. of inside surface.	Length of Pipe per sq. ft. of outside surface.	Internal Area.	External Area.	Weight per foot.
Ins.	Ins.	Ins.	Ins.	Ins.	Feet.	Feet.	Ins.	Ins.	lbs.
1	3.142	0.856	2.689	0 072	4.460	3.819	0 575	0.785	0.703
1¼	3 927	1.126	3.474	0.072	3.455	3 056	0 960	1.227	0.9
1½	4.712	1.334	4.191	0.083	2.863	2.547	1.396	1.767	1.250
1¾	5.598	1.560	4 901	0.095	2.448	2.183	1.911	2.405	1.665
2	6.283	1.804	5.667	0.098	2.118	1.909	2.556	3. 42	1.981
2¼	7 069	2 054	6.484	0.098	1.850	1.698	3.314	3.976	2.238
2½	7.854	2.283	7.172	0.109	1.673	1.528	4.094	4 939	2.755
2¾	8.639	2.533	7.957	0.109	1.508	1.390	5.039	5.940	3.045
3	9.425	2.783	8.743	0 109	1.373	1.273	6.083	7.069	3.333
3¼	10.210	3.012	9.462	0.119	1.268	1.175	7 125	8.296	3.958
3½	10 995	3.262	10.248	0.119	1.171	1.091	8.357	9.621	4.272
3¾	11.781	3.512	11.033	0.119	1.088	1.018	9.687	11.045	4.590
4	12.566	3.741	11.753	0.130	1.023	0.955	10.992	12.566	5.320
4½	14.137	4.241	13.323	0.130	0.901	0.849	14.126	15.904	6 01
5	15.708	4.72	14.818	0.140	0.809	0.764	17.497	19.635	7.226
6	18 849	5.699	17.904	0 151	0.670	0.637	25.509	28.274	9.346
7	21.991	6 657	20.914	0.172	0.574	0.545	34.805	38.484	12.435
8	25.132	7.636	23.989	0.182	0.500	0.478	45.795	50.265	15.109
9	28.374	8.615	27.055	0.193	0.444	0.424	58.291	63.617	18.002
10	31.416	9.573	30.074	0.214	0.399	0.382	71.975	78.540	22.19

Light Wrought Iron Artesian Tube and Casing for Oil Wells.

STANDARD SIZES.

Outside Diameter in inches.	Inside Diameter in inches.	Weight per Foot, Pounds.	Outside Diameter, Inches.	Inside Diameter, Inches.	Weight per Foot, Pounds.
1¾	1½	1 665	4¼	4	5.500
2¼	2	2.238	4½	4¼	6.010
2½	2¼	2.755	5	4¾	7.226
2¾	2½	3.045	5¼	5	7.667
3	2¾	3.333	5½	5 3-16	8.083
3¼	3	3.958	6	5⅝	9.346
3½	3¼	4.272	6⅝	6¼	10 064
3¾	3½	4.950	7	6⅝	12.435
4	3¾	5.320	8	7⅝	15.109
			8⅝	8¼	16.155

BRAZED COPPER PIPES.

WEIGHT PER RUNNING FOOT IN POUNDS.

Diam. inch.	Thickness in Inches.					
	1-16	3-16	⅛	5-16	⅛	7-16
1	.8	1.2	1.7	2.7	3.8	4.9
¼	1.	1.5	2.1	3 3	4.5	6.
½	1.2	1.8	2.5	3.8	5.3	6.9
¾	1.4	2.1	2.8	4.4	6.	7.8
2	1.5	2.4	3.2	4.9	6.8	8.7
¼	1.8	2.6	3.6	5.5	7.6	9.7
½	1.9	2.9	4.	6.1	8.4	10.6
¾	2.1	3.2	4.4	6.7	9 1	11.7
3	2.3	3.5	4.7	7.3	9.9	12.5
½	2.7	4.	5.5	8 4	11.4	14.4
4	3.	4.6	6.3	9.5	12.9	16.3
½	3.4	5.2	7.	10.7	14.4	18.2
5	3.8	5.7	7.8	11.8	16.	20.1
½	4.2	6.3	8.5	13.1	17.5	22.5
6	4.6	6.8	9.3	14.1	19.	23.9

Standard Sizes, Lengths, &c., of Seamless Drawn Tubing.

Inches Outside Diam.	Length Feet.	Brown & Sharpe's Gauge.	Weights per Foot. Brass.	Copper.	Inches Outside Diam.	Length Feet.	Brown & Sharpe's Gauge.	Weights per Foot Brass.	Copper.
⅝	12	16	⅜	⅜	1 15-16	12	11&10	2	2 1-10
¾	12	15	½	½	2	12	"	2 1-5	2¼
13-16	12	15	9-16	9-16	2⅛	10	"	2¼	2⅜
⅞	12	15	⅝	⅝	2¼	10	"	2⅜	2½
15-16	12	15	11-16	11-16	2⅜	10	"	2½	2⅞
1	12	14	¾	¾	2½	10	S&8½	2¾	3
1⅛	12	14	⅞	⅞	2⅝	10	"	3	3⅛
1¼	12	13	1¼	1	2¾	10	"	3⅛	3¼
1⅜	12	12½	1⅜	1⅜	3	10	"	3 1-3	3½
1½	12	12	1½	16-10	3¼	10	"	3⅞	4⅛
1⅝	12	11½	1⅝	17-10	3½	10	"	4¼	4⅜
1¾	12	11	1¾	18-10	4	10	"	5	5¼
1 13-16	12	11	1 13-16	19-10	5	10	"	7	8
1⅞	12	11&10	1⅞	1 15-16					

Weight of Brass, Copper, and Zinc Tubing, per Foot.

Numbered by Brown & Sharpe's Gauge. Weights in Thousandths of Lbs.

BRASS. No. 17.		BRASS. No. 20.		COPPER Lightning Rod Tube. No. 23.	
Inch.	Lbs.	Inch.	Lbs.	Inch.	Lbs.
¼	.107	⅛	.032	½	.162
5-16	.157	3-16	.039	9-16	.176
⅜	.185	¼	.063	⅝	.186
7-16	.234	5-16	106	11-16	.211
½	.266	⅜	.126	¾	.229
9-16	.318	7-16	158		
⅝	.333	½	.189		
¾	.377	9-16	.208	ZINC. No. 20.	
⅞	.462	⅝	.220		
1	.542	¾	.252		
1⅛	.675	⅞	.284	⅛	.161
1¼	.740	1	.378	⅝	.185
1½	.915	1¼	.500	¾	.234
1¾	.980	1½	.580	⅞	.272
2	1.90			1	.311
2½	1.506			1¼	.380
3	2.188			1½	.452

Value of Iron.

VALUE PER GROSS TON (2240 LBS.) OF IRON AT FROM 1-10TH OF A CENT TO 10 CENTS PER POUND, INCREASING AT RATE OF 1-10TH OF A CENT PER POUND.

Per lb. in cts. & 1-10ths.	Price Per Ton	Per lb. in cts. & 1-10ths.	Price Per Ton	Per lb. in cts. & 1-10ths.	Price Per Ton
1-10	$ 2.24	3 5-10	$ 78.40	6 8-10	$152.32
2-	4.48	6-	80.64	9-	154.56
3-	6.72	7-	82.88	7	156.80
4-	8.96	8-	85.12	1-10	158.04
5-	11.20	9-	87.36	2-	161.28
6-	13.44	4	89.60	3-	163.52
7-	15.68	1-10	91.84	4-	165.76
8-	17.92	2-	94.08	5-	168.00
9-	20.16	3-	96.32	6-	170.24
1	22 40	4-	98.56	7-	172.48
1-10	24.64	5-	100.80	8-	174.72
2-	26.88	6-	103.04	9-	176.96
3-	29.12	7-	105.28	8	179.20
4-	31.36	8-	107.52	1-10	181.44
5-	33.60	9-	109.76	2-	183.68
6-	35.84	5	112.00	3-	185 92
7-	38.08	1-10	114.24	4-	188.16
8-	40.32	2-	116.48	5-	190.40
9-	42.56	3-	118.72	6-	192.64
2	44.80	4-	120.96	7-	194.88
1-10	47.04	5-	123.20	8-	197.12
2-	49.28	6-	125.44	9-	199.36
3-	51.52	7-	127.68	9	201.60
4-	53 76	8-	129.92	1-10	203.84
5-	56 00	9-	132.16	2-	206.08
6-	58.24	6	134.40	3-	208.32
7-	60.48	1-10	136.64	4-	210.56
8-	62 72	2-	138.88	5-	212.80
9-	64.96	3-	141.12	6-	215.04
3	67.20	4-	143.36	7-	217.28
1-10	69.44	5-	145.60	8-	219.52
2-	71.68	6-	147.84	9-	221.76
3-	73.92	7-	150.08	10	224.00
4-	76.16				

Hoop and Scroll Iron.

NUMBER OF FEET IN A BUNDLE OF FIFTY-SIX POUNDS.

HOOP IRON.			SCROLL IRON.		
Size.		Feet in Bundle.	Size.		Feet in Bundles.
Width.	Thick.		Width.	Thick.	
⅝ inches.	No. 21	815	½ inches.	No. 10	240
¾ "	" 20	630	⅝ "	" 16	430
⅞ "	" 19	450	⅝ "	" 14	347
1 "	" 18	360	⅝ "	" 10	190
1⅛ "	" 17	278	¾ "	" 16	360
1¼ "	" 16	217	¾ "	" 14	290
1⅜ "	" 15	160	¾ "	" 12	208
1¾ "	" 15	139	¾ "	" 10	160
2 "	" 14	110	⅞ "	" 16	310
			⅞ "	" 14	249
			⅞ "	" 12	175
			1 "	" 16	270
			1 "	" 14	216
			1 "	" 12	152

LIST OF EXTRAS ON BAR IRON.

ORDINARY SIZES. } Rounds and Squares. .....$\frac{3}{4}$ to 2 in. diam.
Flats.....1 to 4×$\frac{3}{8}$ to 1½ and 4$\frac{1}{8}$ to 6×$\frac{3}{8}$ to 1.

EXTRA SIZES.

Rounds and Squares.	Extra in cts. per lb	Flats.	Extra in cts. per lb	Flats.	Extra in cts. per lb
No 6 and $\frac{3}{16}$ in.	1.3	1½×$\frac{3}{32}$	4.0	1$\frac{7}{16}$×$\frac{7}{32}$	1.5
No. 5	1.0	1½×$\frac{1}{8}$	3.5	1$\frac{7}{16}$×$\frac{1}{4}$	1.3
No. 4	0.8	1½×$\frac{5}{32}$	3.0	½ & $\frac{9}{16}$×$\frac{3}{16}$	1.2
Nos. 2, 3, ¼ & $\frac{9}{32}$	0.7	1½×$\frac{3}{16}$	2.5	½ & $\frac{9}{16}$×¼ to ⅜	1.1
$\frac{5}{16}$	0.6	⅝×$\frac{3}{32}$	3.6	⅝ & 1$\frac{1}{16}$×$\frac{3}{16}$	0.9
⅜	0.5	⅝×$\frac{1}{8}$	3.0	⅝ & 1$\frac{1}{16}$×¼ & $\frac{5}{16}$	0.7
$\frac{7}{16}$	0.4	⅝×$\frac{5}{32}$	2.5	⅝ & 1$\frac{1}{16}$×⅜ to ½	0.5
½ & $\frac{9}{16}$	0.2	⅜×1$\frac{1}{64}$	2.3	¾×$\frac{3}{16}$	0.7
⅝ & 1$\frac{1}{16}$	0.1	⅜×$\frac{3}{16}$	2.0	¾×¼ & $\frac{5}{16}$	0.5
2$\frac{1}{8}$ to 2$\frac{7}{8}$	0.1	⅜×$\frac{7}{32}$	1.8	¾×⅜ to ⅝	0.4
3 to 3½	0.3	⅜×¼	1.6	⅞×$\frac{3}{16}$	0.6
3$\frac{9}{16}$ to 4	0.5	1$\frac{3}{32}$×$\frac{3}{32}$	3.0	⅞×¼ & $\frac{5}{16}$	0.5
4$\frac{1}{16}$ to 4½	0.6	1$\frac{3}{32}$×⅛	2.6	⅞×⅜ to ¾	0.4
4$\frac{9}{16}$ to 5	0.8	1$\frac{3}{32}$×$\frac{9}{64}$	2.5	1×$\frac{3}{16}$	0.4
HALF ROUND.		1$\frac{3}{32}$×$\frac{5}{32}$	2.2	1 to 6×¼×$\frac{5}{16}$	0.2
		1$\frac{3}{32}$×$\frac{3}{16}$	1.8	2 to 4×1$\frac{9}{16}$ to 2	0.2
⅞ to 1¼	0.5	1$\frac{3}{32}$×$\frac{7}{32}$	1.6	2 to 4×2$\frac{1}{16}$ to 3	0.3
¾ & 1$\frac{3}{16}$	0.6	1$\frac{3}{32}$×¼	1.4	4$\frac{1}{16}$ to 6×1$\frac{1}{16}$ to 2	0.2
⅝ & 1$\frac{1}{16}$	0.7	$\frac{7}{16}$×⅛	2.3	4$\frac{1}{16}$ to 6×2$\frac{1}{16}$ to 3	0.4
½ & $\frac{9}{16}$	0.9	$\frac{7}{16}$×$\frac{5}{32}$	1.9		
⅜ & $\frac{7}{16}$	1.1	$\frac{7}{16}$×$\frac{3}{16}$	1.6		

For cutting to specific lengths, 10 to 20 feet, 0.2 cent extra.

CAST STEEL CROWBARS.

Weight	—	8	10	12	14	16	18
Inch Square	—	$\frac{7}{8}$	1	1$\frac{1}{16}$	1⅛	1$\frac{3}{16}$	1¼
Inches in Length.	—	48	54	62	63	66	67
Weight	20	22	24	26	28	30	
Inch Square	1¼	1$\frac{5}{16}$	1⅜	1⅜	1½	1½	
Inches in Length..	72	72	72	74	74	76	

COPPER SHEATHING SHEETS.

Sheathing is the name applied only to sheets measuring 14x48 inches.
Showing Wt. per sheet. No. of sheets per case and Wt per case.

Oz. per sq. foot...	16	18	20	22	24	26	28	30	32
Pounds per sheet.	4.10	5.4	5.13	6.7	7.	7.9	8.3	8.12	9.5
Sheets per case...	125	115	100	100	85	80	75	70	65
Pounds per case..	583	604	583	642	595	607	613	613	607

Weight of Flat Iron.

WEIGHT OF RUNNING FOOT IN POUNDS.

Width in Inches.	Thickness in Inches.					
	1-16	1-8	3-16	1-4	5-16	3-8
1	.21	.41	.62	.83	1.04	1.25
1/8	.23	.47	.7	.94	1.17	1.41
1/4	.26	.52	.78	1.04	1.3	1.56
3/8	.29	.57	.86	1.14	1.43	1.72
1/2	.31	.62	.94	1.25	1.56	1.87
5/8	.34	.68	1.01	1.35	1.69	2.03
3/4	.36	.73	1.09	1 46	1 82	2.19
7/8	.39	.78	1.17	1.56	1.95	2.34
2	.42	.83	1.25	1.67	2.08	2.5
1/8	.44	.88	1.33	1.77	2.21	2.65
1/4	.47	.94	1.4	1.87	2.34	2.81
3/8	.5	.99	1.48	1.98	2.47	2.97
1/2	.52	1.04	1.56	2.09	2.6	3.12
5/8	.55	1.09	1.64	2.19	2.73	3.28
3/4	.57	1.14	1.72	2.29	2.86	3.44
7/8	.6	1.2	1.8	2.4	2.99	3.59
3	.62	1.25	1.87	2.5	3.12	3.75
1/8	.65	1.3	1.95	2.6	3.26	3.91
1/4	.68	1.35	2.03	2.7	3.38	4.06
3/8	.7	1.4	2.11	2.81	3.52	4.22
1/2	.73	1.46	2.19	2.91	3.65	4.37
5/8	.76	1.51	2.27	3.02	3.78	4.53
3/4	.78	1.56	2.34	3.12	3.91	4.69
7/8	.81	1.61	2.42	3.23	4.03	4.84
4	.83	1.66	2.5	3.33	4.17	5.00
1/8	.86	1.72	2.58	3.44	4.3	5.16
1/4	.88	1.77	2.66	3.54	4.43	5.31
3/8	.91	1.82	2.73	3.64	4.56	5.47
1/2	.94	1.87	2.81	3.75	4.69	5.62
5/8	.96	1.93	2.89	3.85	4.82	5.78
3/4	.99	1.98	2.97	3.96	4.95	5.94
7/8	1.01	2. 3	3.05	4.06	5.08	6.1
5	1.04	2. 8	3.12	4.17	5.21	6.25
1/8	1.06	2.13	3.2	4.27	5.34	6.41
1/4	1.1	2.19	3.28	4.37	5.47	6.56
5 3/8	1.12	2.24	3.36	4.48	5.6	6.72
1/2	1.14	2.29	3.44	4.58	5.73	6.88
5/8	1.17	2.34	3.52	4.69	5.86	7.03
3/4	1.2	2.39	3.59	4.79	6.	7.19
7/8	1.22	2.45	3.67	4 9	6.12	7.34
6	1.25	2.5	3.75	5.	6.25	7.5
1/8	1.27	2.55	3.83	5.1	6.39	7.66
1/4	1.3	2.6	3.91	5.2	6.51	7.81
3/8	1.32	2.66	3.98	5.31	6.64	7.97
1/2	1.35	2.7	4.06	5.41	6.77	8.13
5/8	1.38	2.76	4.14	5.52	6.91	8.29
3/4	1.40	2.81	4.22	5.62	7.08	8.44
7/8	1.43	2.86	4.3	5.73	7.16	8.59
7	1.46	2.92	4.37	5.83	7.29	8.75
1/4	1.51	3.02	4.53	6.04	7.55	9.07
1/2	1.56	3.12	4.69	6.25	7.81	9.37
3/4	1.61	3.23	4.84	6.46	8.07	9.69
8	1.67	3.33	5.	6.67	8.33	10.
1/4	1.72	3.43	5.16	6.87	8.6	10.3
1/2	1.77	3.54	5.32	7.08	8.85	10.63
3/4	1.82	3.65	5.47	7.29	9.11	10.94
9	1.87	3.75	5.62	7.5	9 37	11.25
1/4	1.93	3.85	5.78	7.71	9.63	11 56
1/2	1.98	3.96	5.94	7.92	9 89	11.87
3/4	2.03	4.06	6.09	8.12	10.15	12.19
10	2.08	4.17	6.25	8.33	10.4	12.5
1/4	2.13	4.27	6.4	8.54	10.67	12.8
1/2	2.19	4.37	6.56	8.75	10.93	13.13
3/4	2.24	4.48	6.72	8.96	11.20	13.43
11	2.29	4.58	6.87	9.16	11.45	13.75
1/4	2.34	4.69	7.03	9.37	11.72	14.06
1/2	2.39	4.79	7.18	9.58	11.97	14.37
3/4	2.45	4.89	7.34	9.79	12.25	14.69
12	2.5	5.	7.5	10.	12.5	15.
.....	.....	.....	.....	.....	.....	.....

Weight of Flat Iron—Continued.

WEIGHT OF RUNNING FOOT IN POUNDS.

Width in Inches.	Thickness in Inches.					
	7-16	1-2	5-8	3-4	7-8	1
1	1.46	1.67	2.08	2.5	2.92	3.33
1⅛	1.64	1.87	2.34	2.81	3.28	3.75
1¼	1.82	2.08	2.6	3.12	3.65	4.17
1⅜	2.01	2.29	2.86	3.44	4.01	4.58
1½	2.19	2.5	3.12	3.75	4.37	5.
1⅝	2.37	2.71	3.38	4.06	4.74	5.42
1¾	2.55	2.92	3.64	4.37	5.1	5.83
1⅞	2.73	3.12	3.9	4 69	5.47	6.25
2	2.92	3.33	4.16	5.	5.83	6.67
2⅛	3.1	3.54	4.43	5.31	6.2	7.08
2¼	3.28	3.75	4.69	5.62	6.56	7.5
2⅜	3.46	3.96	4.95	5.94	6.93	7.92
2½	3.65	4.17	5.21	6 25	7.29	8.33
2⅝	3.83	4.37	5.47	6.56	7.66	8.75
2¾	4.01	4.58	5.73	6.88	8.02	9.17
2⅞	4.19	4.79	5.99	7.19	8.39	9.58
3	4.37	5.	6.25	7.5	8.75	10.
3⅛	4.56	5.21	6.51	7.82	9.12	10.42
3¼	4.74	5.42	6.77	8.12	9.48	10.83
3⅜	4.92	5.62	7.03	8.44	9.84	11.25
3½	5.1	5.83	7.29	8.75	10.21	11.67
3⅝	5.29	6.04	7.55	9.07	10.59	12.08
3¾	5.47	6.25	7.81	9.37	10.93	12.5
3⅞	5.65	6.46	8.07	9.68	11.3	12.92
4	5.83	6.67	8.33	10.	11.65	13.33
4⅛	6.02	6 87	8.59	10.3	12.04	13.75
4¼	6.2	7.08	8.85	10.62	12.4	14.15
4⅜	6.38	7.29	9.11	10.93	12.75	14.59
4½	6.56	7.5	9.37	11.25	13.12	15 00
4⅝	6:74	7.71	9.64	11.55	13.5	15.42
4¾	6.93	7.92	9.89	11.87	13.85	15.83
4⅞	7.11	8.12	10.15	12.2	14.22	16.25
5	7.29	8.33	10.42	12.5	14.59	16.65
5⅛	7.48	8.54	10.69	12.8	14.95	17.09
5¼	7.66	8.75	10.93	13.13	15.3	17.5
5⅜	7.84	8.96	11.2	13.43	15.68	17.92
5½	8.02	9.17	11.45	13.75	16.03	18.33
5⅝	8.2	9.37	11.72	14.07	16.4	18.75
5¾	8.39	9.58	11.99	14.37	16.77	19.15
5⅞	8.57	9.79	12.25	14.7	17.13	19.58
6	8.75	10.	12.5	15.	17.5	20.
6⅛	8.93	10.2	12.77	15.3	17.85	20.42
6¼	9.11	10.42	13.02	15.62	.8.23	20.83
6⅜	9.3	10.63	13.29	15.93	18.6	21.25
6½	9.48	10.83	13.53	16.25	18.97	21.65
6⅝	9.67	11.03	13.81	16.57	19.33	22.08
6¾	9.84	11.25	14.05	16.87	19.7	22.5
6⅞	10.02	11.45	14.32	17.19	20.03	22.92
7	10.2	11.65	14.59	17.5	20.42	23.33
7¼	10.59	12.09	15.1	18.13	21.15	24.15
7½	10.93	12.5	15.62	18.73	21.85	25.
7¾	11.31	12.92	16.15	19.39	22.62	25.83
8	11.66	13.33	16.65	20.	23.33	26.65
8¼	12.03	13.75	17.18	20.6	24.05	27.5
8⅜	12.4	14.17	17.7	21.25	24.8	28.33
8¾	12.76	14.58	18.23	21.89	25.52	29.17
9	13.12	15.	18.75	22.5	26.23	30.
9¼	13.5	15.42	19:27	23.12	26.98	30 83
9⅜	13.85	15.83	19.78	23.73	27.7	31.67
9¾	14.2	16.25	20.32	24.35	28.42	32.5
10	14.59	16 65	20.82	25.	29.15	33.33
10¼	14.93	17.08	21.33	25.62	29.88	34.17
10½	15.3	17.5	21.89	26.25	30.62	35.
10¾	15.67	17.92	22.4	26.85	31.33	35.83
11	16.03	18.33	22.9	27.5	32.08	36.65
11¼	16.4	18.75	23.43	28.12	32.8	37.5
11½	16.75	19.15	23.93	28.73	33 52	38.33
11¾	17.13	19.59	24.49	29.35	34.25	39.15
12	17.5	20.	25.	30.	35.	40.
.....	.....	.....	.....	.....	.....	.....

FLAT IRON.

NUMBER OF FEET IN A BUNDLE OF 112 POUNDS.

Size.	Feet in Bundle.	Size.	Feet in Bundle.
½ by ¼ inch	267	⅞ by ¼ inch	155
½ " 5-16 "	216	⅞ " 5-16 "	122
½ " ⅜ "	175	⅞ " ⅜ "	100
⅝ " ¼ "	214	⅞ " 7-16 "	90
⅝ " 5-16 "	170	⅞ " ½ "	75
⅝ " ⅜ "	145	⅞ " ⅝ "	60
⅝ " ½ "	106	1 " ¼ "	135
¾ " ¼ "	175	1 " 5-16 "	106
¾ " 5-16 "	142	1 " ⅜ "	90
¾ " ⅜ "	120	1 " 7-16 "	78
¾ " 7-16 "	103	1 " ½ "	65
¾ " ½ "	90	1 " 9-16 "	60
¾ " ⅝ "	70	1 " ⅝ "	52

Round and Square Iron.

NUMBER OF FEET IN A BUNDLE OF 112 POUNDS.

ROUND IRON.		SQUARE IRON.	
Size.	Feet in Bundle.	Size.	Feet in Bundle.
3-16 inch	1115	3-16 inch	953
¼ "	688	¼ "	540
5-16 "	440	5-16 "	345
⅜ "	305	⅜ "	240
7-16 "	225	7-16 "	176
½ "	170	½ "	135
9-16 "	136	9-16 "	107
⅝ "	110	⅝ "	87
11-16 "	90	11-16 "	70
¾ "	75	¾ "	60

Round Bar Iron.

WEIGHT OF A RUNNING FOOT IN POUNDS.

Diam. Inch.	Wt per. foot. Lbs.	Diam. Inch.	Wt. per foot. Lbs.	Diam. Inch.	Wt. per foot. Lbs.	Diam. Inch.	Wt. per foot. Lbs.
1-16	.01	1 1-16	2.975	2⅛	11.9	4 ⅛	44.85
⅛	.0411	⅛	3.338	¼	13.3	¼	47.54
3-16	.0925	3-16	3.725	⅜	14.75	⅜	50.33
¼	.1651	¼	4.12	½	16.4	½	53.32
5-16	.2573	5-16	4.545	⅝	18.1	⅝	56.34
⅜	.371	⅜	5.	¾	19.85	¾	59.44
7-16	.505	7-16	5.455	⅞	21.5	⅞	62 62
½	.657	½	5.945	3	23.7	5	65.88
9-16	.835	9-16	6.445	⅛	25.55	⅛	69.23
⅝	1 031	⅝	6.975	¼	27.81	¼	72.65
11-16	1.235	11-16	7.52	⅜	29.85	⅜	76.18
¾	1.475	¾	8.05	½	32.25	½	79.75
13-16	1.74	13-16	8.65	⅝	34.45	⅝	83.45
⅞	2.015	⅞	9.25	¾	37.1	¾	87.20
15-16	2.317	15-16	9.9	⅞	39.5	⅞	91.50
1	2.625	2	10.55	4	41.95	6	95.

FOR STEEL multiply tabular number above (for size) 1.01.

SQUARE BAR IRON.

WEIGHT OF A RUNNING FOOT, IN POUNDS.

Thick Inch.	Wt. per ft. Lbs.	Thick Inch.	Wt. per ft. Lbs.	Thick Inch.	Wt. per ft. Lbs.	Thick Inch.	Wt. per ft. Lbs.
1-16	.0131	1 1-16	3.80	2 1-8	15.15	4 1-8	57.20
1-8	.0525	1-8	4.25	1-4	17.	1-4	60.75
3-16	.1182	3-16	4.73	3-8	18.5	3-8	64.35
1-4	.2103	1-4	5.25	1-2	25.5	1-2	68.
5-16	.3200	5-16	5.78	5-8	23.1	5-8	72.
3-8	.4735	3-8	6.35	3-4	25.2	3-4	75.65
7-16	.6445	7-16	6.95	7-8	27.5	7-8	79.80
1-2	.84	1-2	7.55	3	30.05	5	83.8
9-16	1.063	9-16	8.2	1-8	32.75	1-8	88.25
5-8	1.314	5-8	8.85	1-4	35.5	1-4	92.5
11-16	1.59	11-16	9.57	3-8	38.25	3-8	97.15
3-4	1.85	3-4	10.30	1-2	41.15	1-2	101.
13-16	2.221	13-16	11.05	5-8	44.15	5-8	105.8
7-8	2.575	7-8	11.83	3-4	47.20	3-4	110.5
15-16	2.95	15.16	12.62	7-8	50.25	7-8	115.15
1	3.35	2	13.4	4	53 75	6	120.25

FOR STEEL multiply tabular number above (for size) by 1.01.

BAND IRON.

NUMBER OF FEET IN A BUNDLE OF 112 POUNDS.

Size.		Feet in Bundle.	Size.		Feet in Bundle.
Width.	Thick.		Width.	Thick.	
1⅛ inches.	No. 12	265	2¼ inches.	No. 12	110
1⅛ "	" 10	213	2¼ "	" 10	88
1⅛ "	" 7	160	2¼ "	" 8	72
1¼ "	" 12	246	2¼ "	" 6	60
1¼ "	" 10	190	3 "	" 12	101
1¼ "	" 7	145	3 "	" 10	80
1½ "	" 12	205	3 "	" 8	66
1½ "	" 10	160	3 "	" 6	57
1½ "	" 7	120	3¼ "	" 10	75
1¾ "	" 12	175	3¼ "	" 8	60
1¾ "	" 10	138	3¼ "	" 6	50
1¾ "	" 8	110	3½ "	" 10	69
1¾ "	" 7	100	3½ "	" 8	57
2 "	" 12	155	3½ "	" 6	48
2 "	" 10	120	4 "	" 10	60
2 "	" 8	99	4 "	" 8	50
2 "	" 7	90	4 "	" 6	40
2 "	" 6	81	4¼ "	" 10	52
2¼ "	" 12	135	4½ "	" 8	43
2¼ "	" 10	105	4½ "	" 6	35
2¼ "	" 8	88	5 "	" 10	48
2¼ "	" 6	72	5 "	" 8	40
2½ "	" 12	120	5 "	" 6	34
2½ "	" 10	95	6 "	" 10	40
2½ "	" 8	77	6 "	" 8	32
2½ "	" 6	65	6 "	" 6	26

Weight of Tire Iron,

PER SET OF 54 FEET.

Size.	Lbs.	Size.	Lbs.	Size.	Lbs.
1 by 3-16	34	1 1-4 by 1-4	56	1 1-2 by 5-8	169
1 by 1-4	45	1 1-4 by 5-16	70	1 5-8 by 1-2	148
1 by 5-16	56	1 1-4 by 3-8	85	1 5-8 by 5-8	183
1 by 3-8	68	1 1-4 by 7-16	99	1 3-4 by 1-2	158
1 1-8 by 1-4	50	1 1-4 by 1-2	113	1 3-4 by 5 8	197
1 1-8 by 5-16	63	1 3-8 by 3-8	93	1 3-4 by 3-4	236
1 1-8 by 3-8	75	1 3-8 by 1-2	124	2 by 1-2	180
1 1-8 by 7-16	88	1 1-2 by 3-8	101	2 by 5-8	225
1 1-8 by 1-2	101	1 1-2 by 1-2	135	2 by 3-4	270

Railroad Spikes.

NUMBER IN 100 POUNDS.

Thickness	Length.									
	3	4	5	6	7	8	9	10	12	14
1-4	1340	1060	870	680						
5-16		620	580	540						
3-8			460	380	320	290	250			
7-16			320	280	240	220	200			
1-2			260	210	180	170	140	130	110	
5-8			170	130			100	90	80	70

Wrought Boat and Ship Spikes.

NUMBER IN A KEG OF 150 POUNDS.

Thickness	Length.													
	3	3½	4	4½	5	5½	6	6½	7	7½	8	8½	9	9½	10
1-4	1910	1585	1326	1223	1025										
5-16	1010	963	810	605	583		521								
7-16			642	503	461	423	402	321							
1-2					340	312	298	280	261	240	223				
9-16							221	200	190	180	170	160	150	140	130
5-8											140	130	120	110	100

Sizes of Tanks and Contents.

Diameter.	Depth.	Gallons.	Diameter.	Depth.	Gallons.
Feet.	Feet.		Feet.	Feet.	
12	8	6,767	24	12	40,607
14	9	10,363	26	13	51,628
16	9	13,535	28	14	64,481
18	10	19,034	30	15	79,310
20	10	23,499	32	16	96,253
22	11	31,277	34	17	115,451

Capacity of Cisterns and Reservoirs in Gallons.

DEPTH 10 INCHES; DIAMETER FROM 2 TO 25 FEET.

2 feet 19.5	5 feet ..122.40	8 feet ..313.33	12 feet ... 705.
2½ " 30.6	5½ " ..148.10	8½ " ..353.72	13 " ... 827.4
3 " 44.06	6 " ..176.25	9 " ..396.56	14 " ... 959.6
3½ " 59.97	6½ " ..206.85	9½ " ..461.40	15 " ...1,101.6
4 " 78.33	7 " ..239.88	10 " ..489.20	20 " ...1,958.4
4½ " ... .99 14	7½ " ..275.40	11 " ..592.40	25 " ...3,059.9

CAPACITY OF BOXES.—A box 24 inches long by 16 inches wide, and 28 inches deep, will contain a barrel (3 bushels).

A box 24 inches long by 16 inches wide, and 14 inches deep, will contain half a barrel.

A box 16 inches square and 8.4 inches deep, will contain one bushel.

A box 8 inches by 8.4 inches square, and 8 inches deep, will contain one peck.

A box 8 inches by 8 inches square, and 4.2 inches deep, will contain one gallon.

Table of Dimensions of Various Measures of Capacity.

Size.	Diameter of Top.	Diameter of Bottom.	Height.
	Inches.	Inches.	Inches.
1 gallon.	5⅛	6⅛	9¼
½ "	4	4⅞	8
1 quart...	3½	4	5¾
1 gallon.	4	7	8⅝
½ "	6⅛	4	4
5 "	8	1 ¼	12⅞
3 "	7	11⅝	10¼
2 "	6	10½	8⅞
1 "	3¾	8¾	7¾
20 quarts.	19¼	13	8
16 "	18	11¼	6¼
14 "	15¼	9¼	6¼
10 "	14¾	11	4⅛
1 pint...	2⅞	3⅛	4¼
½ "	2⅜	2⅞	3⅛
3 quarts.	3½	6	8½
1 pint...	4¼	3¾	2¾
½ gallon.	3⅛	6⅝	6¼
1 "	2½	5⅛	5
1 "	2	4⅛	4⅛
½ "	1¾	3¼	3⅛
2 quarts.	9	6	3¾
3 pints..	8¼	5¾	2¾
1 pint....	6¼	4	2¼
Pie.....	9	7½	1¾

Weight of Sheet and Plate Iron.

THICKNESS BY BIRMINGHAM WIRE GAUGE AND INCHES, WEIGHT OF A SQUARE FOOT IN POUNDS.

THICKNESS.		Weight Pounds.	THICKNESS.		Weight Pounds.
B. W. Gauge.	Part of an inch.		B. W. Gauge.	Part of an inch.	
36	.004	.126	11	.120	4.48
35	.005	.202		1/8 or .125	5.054
34	.007	.283	10	.134	5.426
33	.008	.322	9	.148	5.98
32	.009	.364		5-32 or .1562	6.305
31	.010	.405	8	.165	6.605
30	.012	.485	7	.180	7.27
29	.013	.526		3-16 or .1875	7.578
28	.014	.595	6	.203	8.005
27	.016	.677		7-32 or .2187	8.79
26	.018	.755	5	.22	8.912
25	.020	.811	4	.238	9.62
24	.022	.912		1/4 or .25	10.09
23	.025	1.018	3	.259	10437
22	.028	1.137		9-32 or .2812	11.38
	1-32 or .03125	1.259	2	.284	11.525
21	.032	1.31	1	.3	12.15
20	.035	1.416		5.16 or .3525	12.58
19	.042	1.695	0	.340	13.750
18	.049	1.075		11-32 or .3437	13.875
17	.058	2.35		3/8 or .375	15.10
16	.065	2.637	00	.380	15.26
	1-16 or .0625	2.518		13-32 or .4062	16.34
15	.072	2.92	000	.425	17.125
14	.083	3.35		8-16 or .4375	17.65
	3-32 or .0937	3.78	0000	.454	18.30
13	.095	3.85		15-32 or .4607	18.90
12	.100	4.4	00000	1/2 or .50	20.20

Weight of Sheet and Plate Iron.

THICKNESS IN INCHES. WEIGHT OF A SQUARE FOOT IN POUNDS.

Inches Thick.	Lbs. per Square Foot	Inches Thick.	Lbs. per Square Foot	Inches Thick.	Lbs. per Square Foot.
9-16	22.5	1 3/4	70.62	3 7/8	156.51
5/8	25.21	13-16	73.14	4	161.55
11-16	27.75	7/8	75.58	1/8	166.6
3/4	30.25	15-16	78.20	1/4	171.76
13-16	32.75	2	80.75	3/8	176.71
7/8	35.26	1/8	85.75	1/2	181.77
15-16	37.75	1/4	90.81	5/8	186.79
1	40.35	3/8	95.86	3/4	191.84
1-16	42.87	1/2	100.9	7/8	196.9
1/8	45.4	5/8	105.95	5	201.85
3-16	47.9	3/4	111.	1/8	206.9
1/4	50.45	7/8	116.1	1/4	211.95
5-16	52.96	3	121.15	3/8	217
3/8	55.45	1/8	126.21	1/2	222.05
7-16	58.01	1/4	131.26	5/8	227.01
1/2	60.52	3/8	136.32	3/4	232.15
9-16	63.05	1/2	141.37	7/8	237.2
5/8	65.56	5/8	146.41	6	242.25
11-16	68.11	3/4	151.46		

For STEEL PLATES multiply tabular numbers above (for Size) by 1.01.

Weight and Thickness of Boiler Iron.

1–8	inch	weighs	5	lbs.	per	sq.	ft.
3–16	"	"	7½	"	"		
1–4	"	"	10	"	"		
5–16	"	"	12½	"	"		
3–8	"	"	15	"	"		
7–16	"	"	17½	"	"		
1–2	"	"	20	"	"		

No. 1	Iron	is...	5–16 inch thick.
No. 3	"	...	9–32 "
No. 4	"	...	1–4 "
No. 5	"	...	7–32 "
No. 7	"	...	3–16 "

Thickness of Boiler Iron Required

AND PRESSURES ALLOWED BY THE LAWS OF THE UNITED STATES.

Pressure equivalent to the Standard for a Boiler 42-in. in diameter and ¼ in thickness.

Thickness in 16ths.	Diameter in inches.						
	34	36	38	40	42	44	46
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
5	169.9	160.4	152.	144.4	137.5	131.2	125.5
4½	158.5	149.7	141.8	134.7	128.3	122.5	117 2
4¼	147.2	139.1	131.8	125.1	119.2	113.7	108 8
4	135.9	128.3	121.6	115.5	110.	105	100.
3⅔	124.5	117.6	111.3	105.9	100.8	96.2	92.
3⅓	113.2	106.9	101.3	96.2	91.7	87.5	83..
3	101.9	96.2	91.2	82.6	82.5	78.7	75..

Number of Burden's Rivets in 100 Lbs.

Length, Inches.	Thickness in inches.				Length, Inches.	Thickness in inches.			
	1–2	5–8	11–16	3–4		1–2	5–8	11–16	3–4
¾	1,092	665			3¼	433	267	212	180
⅞	1,027	597			½	413	248	201	169
1	940	538	450		¾	395	241	192	160
⅛	840	512	415		4		230	184	158
¼	797	487	389	356	¼		220	177	150
⅜	760	460	370	329	½		210	171	146
½	730	440	357	280	¾		200	166	138
⅝	711	420	340	271	5		190	161	135
¾	693	390	325	262	¼		180	156	130
⅞	648	375	312	257	½		172	151	124
2	608	360	297	243	¾		164	145	120
⅛	573	354	289	237	6		157	140	115
¼	555	347	280	232	¼		150	138	111
⅜	525	335	260	220	½		146	134	107
½	500	312	242	208	¾		143	129	104
3	460	290	224	197	7		140	125	100

Spring Cotters and Keys and their Applications.

SPRING COTTERS.

No	30	31	32	33	34	35	36	37	39	39
Wire Gauge..	13	13	11	11	7	7	4	4	1	1
For Hole.....	3/32	3/32	1/8	1/8	3/16	3/16	1/4	1/4	5/16	5/16
For Nuts.....	1/2	3/4	3/4	7/8	7/8	1	1	1 1/4	1 1/4	1 1/2

SPRING KEYS.

No	000	00	0	1	1½	2	3	4
Wire Gauge	12	12	12	11	11	10	10	10
For Hole	7/32	7/32	7/32	1/4	1/4	9/32	9/32	9/32
For Bolts	5/8	3/4	7/8	5/8	7/8	5/8	7/8	1

Machine Bolts with Square Heads and Nuts.

WEIGHT OF 100, IN POUNDS.

Length. Inches.	Thickness of Bolt in Inches.							
	¼	5-16	⅜	7-16	½	⅝	¾	⅞
1½	4.16	7.59	10 62	15.94	23.87	39.31	....	.....
¾	4.22	7.87	11.72	16.90	25 06	41.38	.....	.....
2	4.75	8.56	12.38	18 25	26.44	45.69	73.62	.....
¼	5.34	9.12	12.90	19.38	28.62	49.50	76.	.....
½	5.97	9.59	14.69	20.69	29.50	51.25	79.75	.....
¾	6.50	10.44	16.47	21.50	31.16	53.	83.	.....
3	....	10.78	17.87	22.38	32.44	56.	85.38	127.25
½	...	11.81	18.94	26.19	39.75	63.12	93.44	140.56
4	....	....	20.59	28.87	42.50	74.87	108.12	148.37
½	....	....	21.69	29.87	44.87	79.62	113.12	153.76
5	....	....	23.62	32.31	48.81	83.	122.	167.25
½	....	....	25.81	34.44	51.38	87 88	128.62	174.88
6	....	....	26.87	36.62	53.31	92.38	131.75	204.25
½	....	....	....	....	56.87	96.88	139.56	214.69
7	....	....	....	....	59.12	99.87	145 50	228.44
½	....	....	....	....	61.87	105 75	150.88	235.31
8	....	.	....	....	64.44	109 50	157.12	248.88
9	....	....	....	....	70.50	118.12	169.92	258.12
10	. ..	....	....	....	77.	128.13	184.	276.18
11	....	....	....	....	82.88	136.19	195 13	295.69
12	....	....	....	....	86.37	144.87	209.75	311.94
13	....	....	....	....	92.	155.52	219.37	335.81
14	....	....	....	....	97 75	163.58	337.50	351.88
15	....	....	....	....	103.25	170.75	349.05	391.75

Tempering Steel.

(*Haswell.*)

Steel in its hardest state being too brittle for most purposes, the requisite strength and elasticity are obtained by tempering—or *letting down the temper* as it is termed—which is performed by heating the hardened steel to a certain degree and cooling it quickly. The requisite heat is usually ascertained by the color which the surface of the Steel assumes from the film of oxide thus formed.

The degrees of heat to which these several colors correspond are as follows:

At 430, a very faint yellow.	Suitable for hard instruments; as hammer-faces, drills, &c.
At 450, a pale straw color.	
At 470, a full yellow.....	For instruments requiring hard edges without elasticity; as shears, scissors, turning tools, &c
At 490, a brown color.....	
At 510, brown, with purple spots.....	For tools, for cutting wood and soft metals; such as plane-irons, knives, &c.
At 530, purple.....	
As 550, dark blue.....	For tools requiring strong edges, without extreme hardness; as cold-chisels, axes, cutlery, &c.
At 560, full blue.....	
At 600, grayish blue, verging on black.....	For spring-temper, which will bend before breaking; as saws, sword-blades, &c.

If the steel is heated higher than this, the effect of the hardening process is destroyed.

It Has Been Stated

That the temperature of furnaces &c., may be estimated with considerable accuracy by the color of the fire, and that with a little practice the error at very high temperatures will not exceed 90°, or 100°, and the following table contains the result of observations with an air thermometer.

Color of Fire.	Temperature, Degrees F.
Red, just visible.....	977
" dull.....	1,290
" cherry, dull.....	1,470
" " full.....	1,650
" " clear.....	1,830
Orange, deep.....	2,010
" clear.....	2,190
White heat.....	2,370
" bright.....	2,550
" dazzling.....	2,730

Effect of Heat on Various Bodies.

	Degrees
Ammonia boils.....	140
Ammonia (liquid) freezes.....	—46
Antimony melts.....	951
Arsenic melts.....	365
Bismuth melts.....	476
Blood (human) heat of.....	98
" " freezes.....	25
Brandy freezes.....	—7
Brass melts.....	1,900
Cadmium melts.....	600
Coal Tar boils.....	325
Cold, greatest artificial.....	—166
" greatest natural.....	—56
Common Fire.....	790
Copper melts.....	2,548
Glass melts.....	2,377
Gold (fine) melts.....	2,590
Gutta-percha softens.....	145
Heat, cherry red.....	1,500
" " (Daniel).....	1,141
" bright red.....	1,860
" red, visible by day.....	1,077
" white.....	2,900
Ice melts.....	32
Iron (cast) melts.....	3,479
" (wrought) melts.....	3,980
Iron, bright red in the dark...	752
" red hot in twilight.....	884
Lead melts.....	504
Mercury boils.....	662
" volatilizes.....	680
" freezes.....	—39
Naphtha boils.....	156
Petroleum boils.....	306
Platinum melts.....	3,080
Potassium melts.....	135
Proof Spirit freezes.....	—7
Saltpetre melts.....	600
Sea-water freezes.....	28
Silver (fine) melts.....	1,250
Snow and Salt, equal parts.	0
Spirits of Terpentine freezes.	14
Steel melts.....	2,500
" polished, blue.....	580
" " straw color.....	460
Strong Wines freeze.....	20
Sulphur melts.....	226
Sulph Acid (sp. grav 1,641) freezes	—45
Tin melts.....	421
Vinous fermentation.....60 to	77
Water in *vacuo* boils.....	98
Zinc melts.....	740

The sign — before the figures indicates that many degrees beiow zero or o.

Weight of a Lineal Foot of Flat Steel in lbs.

Inch.	1/8	1/4	3/8	1/2	5/8	3/4	1
1/8	.213	.426	.64	...	...	...	..
1/4	.266	.533	.8	1.066	...	...	...
3/8	.319	.639	.959	1.28	1.6	...	...
1	.426	.853	1.28	1.706	2.133	2.559	...
1 1/8	.48	.959	1.439	1 919	2.399	2.879	3.84
1 1/4	.533	1.066	1.6	2.133	2.666	3.200	4.266
1 3/8	.586	1.173	1.759	2.346	2.933	3.519	4 693
1 1/2	.639	1.279	1.919	2.56	3.199	3.84	5.119
1 5/8	.693	1.386	2.079	2.773	3.466	4.16	5.546
1 3/4	.746	1.493	2.24	2.986	3.733	4.479	5.973
2	.853	1.706	2.559	3.413	4.266	5.119	6.826
2 1/8	.906	1.813	2.719	3.626	4.533	5.439	7.253
2 1/4	.96	1.919	2.879	3.84	4.799	5.76	7.68
2 3/8	1.013	2.026	3.039	4.053	5.066	6.079	8.106
2 1/2	1.016	2.133	3.199	4.266	5.333	6.399	8.533
2 5/8	1.019	2.24	3.36	4.48	5.6	6.72	8.96
2 3/4	1.173	2.346	3.519	4.693	5.866	7.039	9.386
3	1.28	2.56	3.84	5.12	6.4	7.68	10.24
3 1/4	1.386	2.773	4.16	5.546	6.933	8.319	11.093
3 1/2	1.493	2.986	4.48	5.973	7.466	8.95	11.946
3 3/4	1.6	3.199	4.799	6.399	7.999	9.599	12.799
4	1.706	3.413	5.119	6.826	8.533	10.239	13.653
4 1/4	1.813	3.626	5.439	7.253	9.066	10.879	14.506
4 1/2	1.92	3.84	5.76	7.68	9.6	11.52	15.36
4 3/4	2.026	4.053	6.079	8.106	10.133	12.159	16.213
5	2.133	4.266	6.399	8.533	10.666	12.799	17.066
5 1/4	2.24	4.48	6.72	8.959	11.199	13.44	17.919
5 1/2	2.346	4.693	7.039	9.386	11.733	14.079	18.773
5 3/4	2.453	4.906	7.359	9.813	12.266	14.719	19.626
6	2.56	5.12	7.68	10.24	12.8	15.36	20.48

American Sizes of Sheet Iron.

The following table gives the pounds and ounces per square foot of plain and galvanized sheet-iron from No. 14 to No. 29, inclusive, and is the table upon which the current price lists of the rolling mills are based.

NUMBERS AND WEIGHTS OF SHEET IRON.

No.	Oz.	Lbs.	Oz.	No.	Oz.	Lbs.	Oz.
14.....	60	3	12	23.....	19	1	3
16.....	48	3	0	24.....	17	1	1
17.....	43	2	11	25.....	16	1	0
18.....	38	2	6	26.....	15		
19.....	33	2	1	27.....	14		
20.....	28	1	12	28.....	13		
21.....	24	1	8	29.....	12		
22.....	21	1	5				

Weight of one foot of Bar Steel.

ROUND.		SQUARE.		OCTAGON.	
Diam. In.	Lbs.	Side In.	Lbs.	Diam. In.	Lbs.
¼	.166	¼	.213	½	.84
⅜	.375	⅜	.479	⅝	1.23
½	.667	½	.855	¾	1.75
⅝	1.04	⅝	1.33	⅞	2.25
¾	1.50	¾	1.91	1	2.75
⅞	2.05	⅞	2.61	1⅛	3.66
1	2.67	1	3.40	1¼	4.55
1⅛	3.38	1⅛	4.34	1⅜	5.50
1¼	4 17	1¼	5.32	1½	6.45
1⅜	5.05	1⅜	6.44	1⅝	7.75
1½	6.00	1½	7.67	1¾	9.20
1⅝	7.05	1⅝	9.00	1⅞	10.04
1¾	8.17	1¾	10.44	2	11.60
1⅞	9.38	1⅞	11.98	2⅛	13.14
2	10.68	2	13.63	2¼	14.75
2⅛	12 04	2⅛	15.35	2¾	16.40
2¼	13.51	2¼	17.20	2½	17.85
2⅜	15.05	2⅜	19.17	2⅝	19.50
2½	16.68	2½	21.20	2¾	21.25
2⅝	18 43	2⅝	23.30	2⅞	22.69
2¾	20.19	2¾	25.70	3	25.00
2⅞	22.00	2⅞	27.74		
3	24.03	3	30.60		
3⅛	26.12	3⅛	33.18		
3¼	28.20	3¼	35.90		
3⅜	30.45	3⅜	38.78		
3½	32 70	3½	41.65		
3⅝	35.12	3⅝	44.17		
3¾	37.54	3¾	46.70		
4	42.71	4	54.40		
4¼	48.22	4¼	61.40		
4½	54.06	4½	68.85		
5	66.75	5	85.00		

American and Birmingham Wire Gauges.

Thickness in Inches. (Taken from Haswell.)

No. of Gauge.	Thick. of Am. G.	Thick. of Bir. G.	No. of Gauge.	Thick. of Am. G.	Thick. of Bir. G.	No. of Gauge.	Thick. of Am. G.	Thick. of Bir. of
	Inch.	Inch.		Inch.	Inch.		Inch.	Inch.
0000	.46	.454	11	.0907	.12	25	.0179	.02
000	.4096	.425	12	.0808	.109	26	.0160	.018
00	.3648	38	13	.0719	.095	27	.0142	.016
0	3248	.34	14	.0641	.083	28	.0126	.014
1	.2893	.30	15	.057	.072	29	.0112	.013
2	.2576	.284	16	.0508	.065	30	.01	.012
3	.2294	.259	17	.0452	.058	31	.0089	.1
4	.2043	.238	18	.0403	.049	32	.0079	.009
5	.1819	.22	19	.0359	.042	33	.007	.008
6	.1620	.203	20	.0319	.035	34	.0063	.007
7	.1443	.18	21	.0284	.032	35	.0056	.005
S	.1285	.165	22	.0253	.028	36	.005	.004
9	.1144	.148	23	.0225	.025			
10	.1019	.134	24	.0201	.022			

Specific Gravity, and Weight

TO CUBIC FOOT OF VARIOUS MATERIALS.

Timber.	Specific gravity.	Weight per cub. foot in pounds.
Ash	.8	50
Beech	.69	43
Birch	.71	44
Cedar	.48	31
Deal, Christ'na	.7	44
Elm	.6	37
Hornbeam	.75	47
Larch	.55	35
Memel	.6	37
Mahogany, Spanish	.8	50
Oak, English	.93	58
Oak, Canadian	.87	54
Pine, Red	.65	41
Pine, Yellow	.45	29
Teak, Moulm'n	.65	41
Yew	.8	50
Miscellaneous.		
Asphaltum	.9	56
Gutta Percha	.98	61
India Rubber	.94	60
Ivory	1.8	112

Fluids.	Specific gravity.	Weight per cub. foot.
Alcohol	.8	50
Ether	.74	46
Oil	.90	56
Water, Fresh	1.000	62.4
Water, Sea	1.028	64.1
Artificial Substances.		
Brick	2.0	124
Brickwork, in mortar	1.6	100
Brickwork, in cement	1.8	112 to 94
Concrete, ordinary	1.9	119
in cement	2.2	133
Cement, Portland	1.3	81
Roman	1.	63
Glass	2.5	156
Lime, quick	.8	50
Mortar	1.7	106
Tile	1.8	112

Stones, Earths, &c.	Specific gravity.	Weight per cub. foot in pounds.
Chalk	2.3	243
Clay	2.	125
Coal	1.3	82
Coke	.8	50
Earth, Rammed	1.6	100
Flint	2.6	163
Gravel	1.9	120
Granite	2.6	164
Grindstone	2.1	131
Limestone	2.5	156
Marble	2.7	168
Sand	1.9	120
Sandstone	2.5	156
Stone, Bath	1.8	112
Stone, Portland,	2 1	131
York Flag	2.3	143
Slate	2.8	175
Shingle	1.4	90

Weight of a Cubic Foot of Various Substances,

IN POUNDS.

Metals.	
Brass	480.
Gun Metal	518.
Copper	545.
Cast Iron	450.
Wrought Iron	482.
Lead	710.
Mercury	849.
Steel	486.
" Plates	452.
Tin	455.
Zinc, Cast	428.
" Rolled	450.

Wood, &c.			
Live Oak	66.75	Coal, Cannel	94.
Hickory	95.5	Cotton, Bale	14.
Pine, White	34.	" Pressed	22.
Spruce	31.25	Earth, Loose	94.
Corkwood	15.	" Mud	102.
Fire Brick	137.	Common Soil	137.
Coal, Anthracite	93.	Hay, Bale	9.5
" Bituminous	80.	" Pressed	25.

WORKSHOP RECIPES--CEMENTS FOR IRON.

To Mend Iron Pots.

Take two parts sulphur, and one part, by weight, of fine black lead; put the sulphur in an old iron pan, holding it over the fire until it begins to melt, then add the lead; stir well until all is melted; then pour out on an iron plate or smooth stone. When cool, break into small pieces. A sufficient quantity of this compound being placed upon the crack of the iron pot to be mended, can be soldered by a hot iron in the same way that a tinsmith solders his sheets. If there is a small hole in the pot, drive a copper rivet in it and then solder it with this cement.

Cement for Annealing Boxes.

Iron filings, 100 parts; lime milk, 40; quartz sand, 50; vinegar, 20. These are worked with water into a paste to which may be added, to render the mass more porous, hair, sawdust, etc.

Iron Cement for Hermetically Closing Stove Doors.

Finest iron filings, 100 parts; sal ammoniac, 10; limestone, 10; soluble glass solution, 10. These are mixed with water to a thick paste, which is applied at once, and is left to dry slowly before heating.

Cement for Broken Iron Vessels.

Iron filings, 10 parts; clay, 60. These are worked with linseed oil into a thick paste, which is applied after some more linseed oil has been added to it, and left to dry slowly.

Rust Cement for Iron.

Wrought-iron filings, 65 parts; sal ammoniac, 2½; sulphur (flour), 1½; sulphuric acid, 1. The solid ingredients are mixed dry, sulphuric acid diluted with sufficient water being then added. This cement dries after two or three days, and unites with the iron, making a very resisting and solid mass.

Cement for Filling Faults in Castings.

Iron filings, free from rust, 10 parts; sulphur, ½; sal ammoniac, 0.8. These are mixed with water to a thick paste, which is rammed into the "faults." This becomes strong when the iron filings are rusted. The parts which have to be cemented are treated before the operation with liquid ammonia, so as to be perfectly free from grease.

Fire-Proof Cement.

(1) Iron filings, 140 parts; hydraulic lime, 20; quartz sand, 25; sal ammoniac, 3. These are formed into a paste with vinegar, and then applied. This cement is left to dry slowly before heating. (2) Iron filings, 180 parts; lime, 45; common salt, 8. These are worked into a paste with strong vinegar. The cement must be perfectly dry before heated. By heating it becomes stone-hard.

Iron Cement for High Temperatures.

(1) Iron filings, 20 parts; lime powder, 45; borax, 5; common salt, 5; permanganate of potash, 10. The borax and salts are dissolved in water, and are then mixed with the two first-named ingredients as quickly as possible and used. This cement changes at a white heat to a glassy mass, which is perfectly air-proof. (2) Permanganate, 25 parts; zinc white, 25; borax, 5. These are treated with a solution of soluble glass, and used at once. This cement must be left to dry slowly, and then it will resist the highest temperatures.

Cement for Gas Retorts.

For cementing earthenware gas retorts, which have to withstand very high temperatures, the following cement can be used: Powdered glass, 5 parts; chamotte meal, 5; powdered borax, 1. Chamotte meal is obtained by pulverizing broken pieces of gas retorts. This cement is a hard glass which only melts at the highest temperature, and then closes the leaks in the retort. To render the iron retort cover which closes the retort air-tight, a cement is used consisting of schwerspath powder, to which as much soluble glass has been mixed as to obtain a paste of sufficient strength.

WORKSHOP RECIPES.

Cement to Resist Fire and Water, and Harden Quickly.

Two parts finely sifted unoxodized iron filings.
One part, perfectly dry, finely powdered loam.
Knead the mixture with strong vinegar into a homogeneous plastic mass, to be used as soon as made.

To Soften Putty.

To remove old putty from broken windows, dip a small brush in nitro-muriatic acid or caustic soda (concentrated lye), and with it annoint or paint over the dry putty that adheres to the broken glass and frames of your windows; after an hours interval, the putty will have become so soft as to be easily removable.

Painter's Putty.

Spanish whiting, pulverized.....	80.6	Made into a stiff paste. If not intended for immediate use, raw oil should be used.
Boiled Oil.....	20.4	

One pound of putty for stopping every 20 yards.

Glazier's Putty.

Whiting, 70 pounds; boiled oil, 30 pounds; water, 2 gallons. Mix. If too thin add more whiting; if too thick, add more oil.

Cement for Stopping Joints, Etc.

White lead in oil, mixed with enough white sand to make it a stiff paste. This grows hard by exposure, and resists heat, cold and water.

Cement for Leather Belting.

Take of common glue and American isinglass, equal parts; place them in a boiler and add water sufficient to cover the whole. Let it soak 10 hours, then bring it to a boiling heat, and add pure tannin until the whole becomes ropey or appears like the whites of eggs. Apply it warm. Buff the grain off the leather where it is to be cemented; rub the joint surfaces solidly together, let it dry a few hours, and it is ready for practical use; and, if properly put together, it will not need riveting, as the cement is nearly of the same nature as the leather itself.

To Remove Rusty Bolts.

To remove bolts that have become rusted badly, without breakiug them, is quite simple if understood. The best method is to apply kerosene oil liberally, and give time for it to soften the rust before any attempt is made to turn the nut. If, after the rust has softened, it does not start easily with the wrench, give a rap on one corner with a blow of the hammer. A hammer and cold chisel rightiy used will often start a rusted nut that would not yield to the wrench without twistiug off the bolt.

How to Prepare Fence Posts.

A western farmer says that he discoverd many years ago that wood could be made to last longer than iron in the ground. Time and weather, he says, seem to have no effect on it. Posts can be prepared for less than two cents apiece. This is the recipe: Take boiled linseed oil and stir it in pulverized charcoal to the consistency of paint. Put a coat of this over the timber, and, he adds, there is not a man that will live to see it rot.

A Practical Rule for Laying Pipe for Draining Land.

Soils.	Depth of Pipe.	Distance apart.
Coarse Gravel Sand.....	4 feet 6 inches.....	60 feet.
Light Sand with Gravel.....	4 "	50 "
Light Loam.....	3 " 6 "	33 "
Loam with Clay.....	3 " 2 "	21 "
" " Gravel.....	3 " 3 "	27 "
Sandy Loam.....	3 " 9 "	40 "
Soft Clay.....	2 " 9 "	21 "
Stiff "	2 " 6 "	15 "

Greatest Fall of Rain is 2 inches per hour=54303.6 galls. per acre.

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STATUARY.

Chairs and Settees.

TABLES.

IRON AND BRASS

BEDSTEADS.

COPPER AND GALVANIZED IRON

LIGHTNING RODS.

CAST IRON

Crestings, Finals,

AND

Bannerets,

For Houses, Churches, Towers and Public Buildings.

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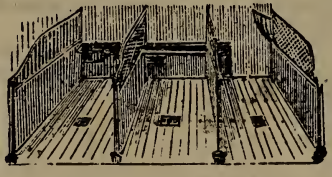

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Water Troughs,
Wood Covered Brackets,
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POWDER AND SAFETY FUSE.

SPORTING POWDER is packed in 5 sizes of grain running from F (coarsest), FF, FG, FFG, FFFG (finest), the sizes in greatest demand being FG and FFG.

BLASTING POWDER.—"*A Blasting*" is packed in 8 sizes of grain, TP (coarsest), TPG, F, FF, FG, FFG, FFFG, FFFFG (finest), the last size being especially adapted for use in Granite quarries.

"*B Blasting*" has 6 sizes of grain, C (coarsest), TP, TPG, F, FF, FFF (finest). It is *glazed* unless otherwise ordered.

SHIPPING POWDER (*extra strength*) is packed in 6 sizes of grain, TPG (coarsest), F, FF, FG, FFG, FFFG (finest).

SAFETY FUSE

Is of 8 qualities: Hemp, Cotton, Superior Mining, Single-Taped' Double-Taped, Triple-Taped, Small Gutta Percha, Large Gutta Percha, the qualities in greatest demand being Cotton and Single-Taped.

12 inches of Hemp Fuse will burn out in about 9 seconds.
12 " Cotton Fuse " " 15 "
12 " Single-Taped Fuse " " 18 "
12 " Double-Taped Fuse " " 20 "

Taped Fuse is made to resist influence of water and severe tamping.

Safety Fuse is packed in barrels, each barrel containing a uniform number of feet, *viz.:*

Cotton Fuse	14,000	feet in each barrel.
Hemp	10,000	" "
Single-Tape Fuse	8,000	" "
Double-Tape Fuse	7,000	" "
Triple-Tape Fuse	5,000	" "

ATLAS POWDER.

Put up in cartridges of either 6 or 8 inches in length, and from ⅞ of an inch to 2 inches in diameter, and packed in 25-lb., 50-lb. short and 50-lb. long boxes (the last, for convenience in handling, contain the powder in five 10-lb. paper boxes placed inside of the wood box.)

Boxes marked		E	contain	20	per cent.	Nitro-Glycerine	Powder.	
"	"	E+	"	25	"	"	"	"
"	"	D	"	30	"	"	"	"
"	"	D+	"	35	"	"	"	"
"	"	C	"	40	"	"	"	"
"	"	C+	"	45	"	"	"	"
"	"	B	"	50	"	"	"	"
"	"	B+	"	60	"	"	"	"
"	"	A	"	75	"	"	"	"

Taking "Atlas C Powder" as a standard, a single cartridge of that grade will weigh in ounces, according to its diameter and length, as follows:

Size of Cartridge.	Weight in Ounces of each Cartridge.	Size of Cartridge.	Weight in Ounces of each Cartridge.
⅞ × 6	3⅓	⅞ × 8	4¼
1 × 6	4½	1 × 8	5¾
1⅛ × 6	5⅝	1⅛ × 8	6⅞
1¼ × 6	6¾	1¼ × 8	8
1½ × 6	9⅞	1½ × 8	12⅛
1¾ × 6	13⅓	1¾ × 8	16
2 × 6	16⅔	2 × 8	20

NOTE.—For lower grades, reduce weight of cartridge; for higher grades, increase weight of cartridge.

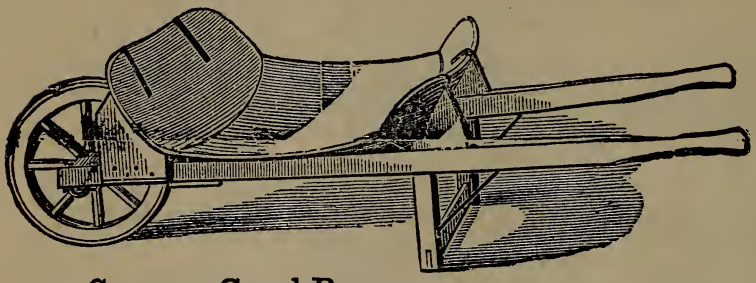
THOMAS McWHINNIE,
POUGHKEEPSIE.
NEW YORK, U. S. A.

MANUFACTURER FOR THE EXPORT TRADE OF EVERY DESCRIPTION OF

WHEEL BARROWS.

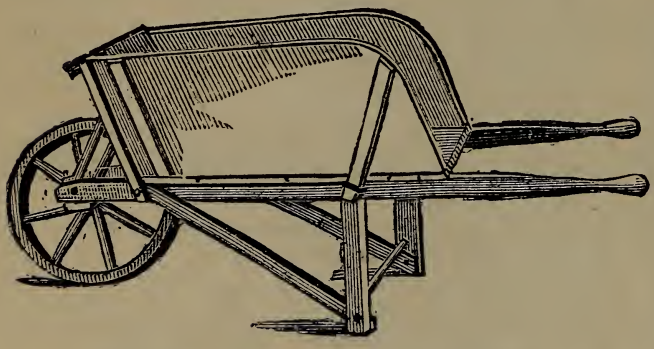
INCLUDING

Canal, Coal, Ore, Stone, Railroad, Brick & Wood Barrows.



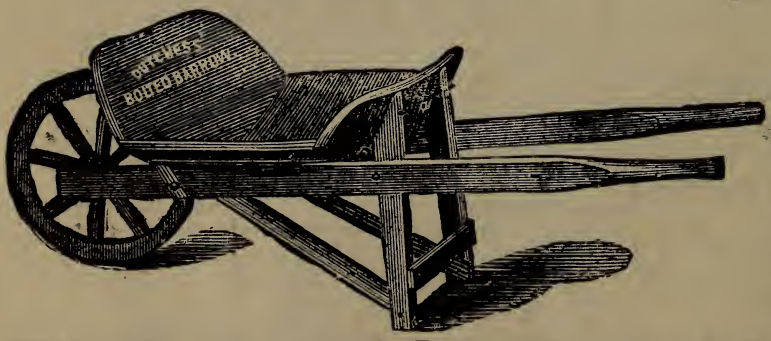
Common Canal Barrow.

COMMON CANAL BARROWS are packed for export in ½ dozen lots making only *two* packages. The six trays in one package, and the Handles, wheels and all other parts in the other package.



Hudson River Garden Barrow.

This Cut represents my New Cheap Garden Barrow, called the Hudson River Garden Barrow. It is also Bolted, made well and strong. The Wheel is made of Bent Felloes (oak), 1½ inches tread, and 18 inches in diameter. I make only one size. It will hold about as much as my No. 3 Dutchess Garden Barrow. The sides are 12 inches high. The Barrows nicely painted and varnished. To pack for shipping—It is the easiest packed Barrow there is in the market. By removing two bolts at the bottom of the legs that go through the Leg and Brace, the whole Barrow folds up in a very small space—can be set up in running order again in very few moments.



Can be packed for shipping in two packages to each ½ dozen in same manner as the common Canal Barrows described above

DUTCHESS "BOLTED" R. R. or CANAL BARROW.

Wheels 18 inches in diameter, and 1½-in. tread, having bent felloes made of oak with Hubs cast in two parts and a wrought iron axle cast in, making an excellent wheel for hot climates as it cannot shrink or get shaky; and being two inches larger than common canal barrows, makes it a very easy barrow to wheel. It is all *bolted* together with *no mortises* in the handles, making it the BEST BARROW OF THE KIND IN THE MARKET.

Plants or Trees.

NUMBER TO THE ACRE AT GIVEN DISTANCES.

Dis. apart.	No. Plants.	Dis. apart.	No. Plants.
½ foot	174,240	6 feet	1,210
1 "	43 560	7 "	889
1½ feet	19,360	8 "	680
2 "	10,890	9 "	573
2½ "	6,969	10 "	435
3 feet by 1 foot	14,520	11 "	360
2 " 2 feet	7,260	12 "	302
3 " 3 "	4,840	15 "	193
4 " 1 foot	10,888	18 "	134
4 " 2 feet	5,444	20 "	108
4 " 3 "	3,629	25 "	69
4 " 4 "	2,722	30 "	49
5 " 5 "	1,742		

Customary and Legal Weight of Various Articles in the United States.

	lbs.		lbs.
Apples.....per bu.	48	Onions.....per bu.	56
" dried..... "	24	Peas..... "	60
Barley..... "	48	Plastering Hair..... "	8
Beans..... "	60	Rape..... "	50
Buckwheat..... "	48	Rye..... "	56
Broom Corn..... "	46	Red Top Seed..... "	14
Blue Grass, Kentucky "	14	Salt, Coarse..... "	50
" " English.. "	24	Salt, Michigan..... "	56
Bran..... "	20	Sweet Potatoes..... "	56
Canary Seed..... "	60	Timothy Seed..... "	45
Castor Beans..... "	46	Turnips..... "	55
Clover Seed..... "	64	Wheat..... "	60
Corn, shelled..... "	56	Beef and Pork, per bbl., net	200
" on ear..... "	70	Flour, per bbl, net.....	196
Corn Meal..... "	50	White Fish and Trout, per bbl., net.....	200
Charcoal..... "	22	Salt, per bbl.....	280
Coal, Mineral..... "	80	Lime, "	220
Cranberries..... "	40	Hay, well settled, per cubic ft.	4½
Dried Peaches..... "	28	Corn, on cob, in bin, "	22
Flax Seed..... "	55	Corn, shelled, " "	45
Hemp Seed..... "	44	Wheat, " "	48
Hungarian Grass Seed "	50	Oats, " "	25½
Irish Potatoes, heaping measure..... "	60	Potatoes, " "	38½
Millet..... "	50	Sand, dry, "	95
Malt..... "	34	Clay, compact, "	135
Oats..... "	32	Marble, "	169
Osage Orange..... "	33	Seasoned Beech Wood, per cord	5,616
Orchard Grass..... "	14	" Hickory, "	6,960

NEW EXCELSIOR HORSE LAWN MOWER.

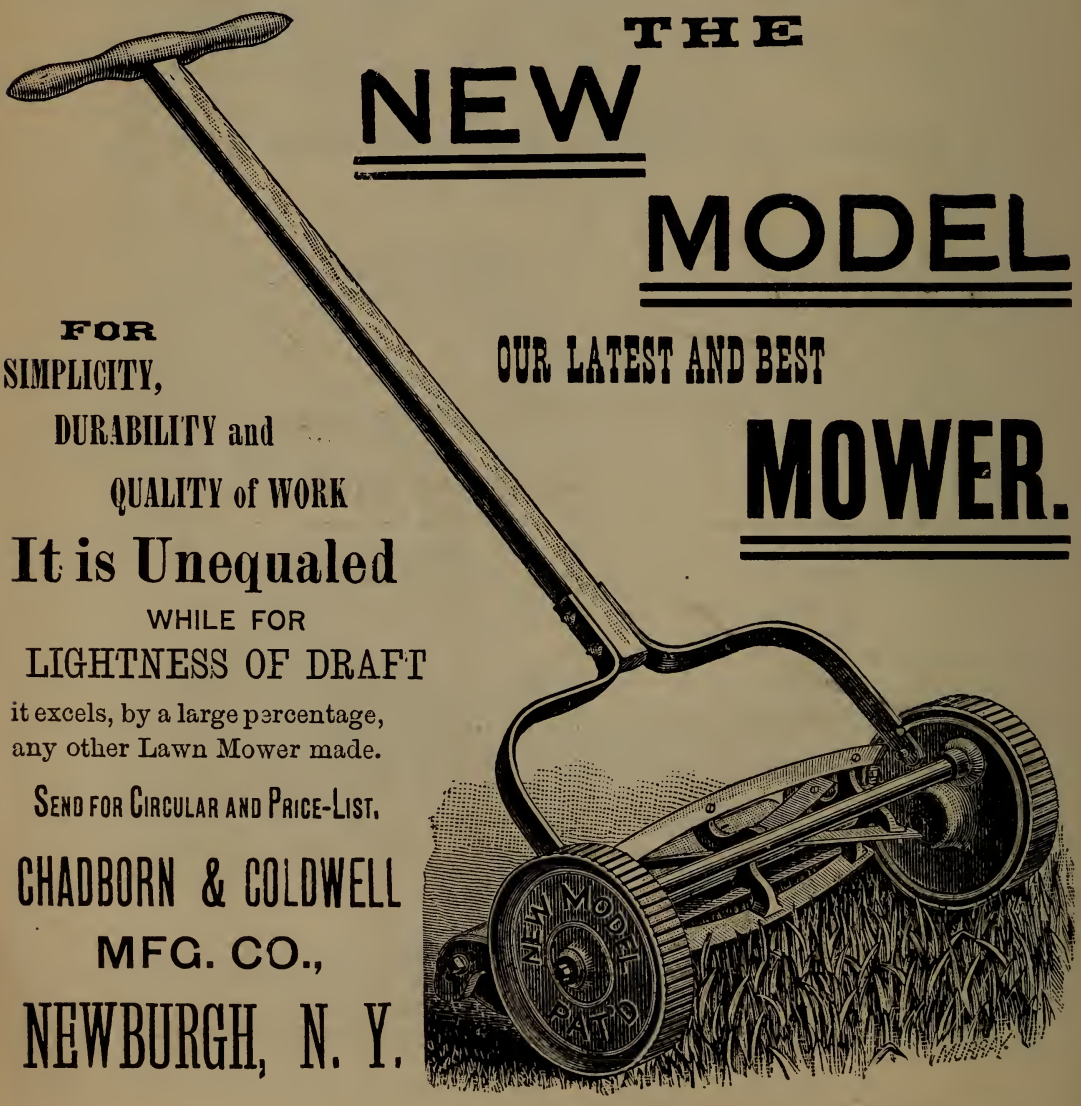
SPECIAL attention is invited to our EXCELSIOR HORSE LAWN MOWER. Its SECTIONAL CASTER WHEELS do not roll down the standing grass nor leave marks on the lawn. Its SIDE-DRAFT ATTACHMENT (which is furnished with the three larger-sized Mowers, allows the horse to walk ONLY on the cut grass. We guarantee it to be the best

Horse Lawn Mower

MANUFACTURED

and to do

PERFECT WORK.



THE NEW MODEL

OUR LATEST AND BEST

MOWER.

FOR

SIMPLICITY,

DURABILITY and

QUALITY of WORK

It is Unequaled

WHILE FOR

LIGHTNESS OF DRAFT

it excels, by a large percentage, any other Lawn Mower made.

SEND FOR CIRCULAR AND PRICE-LIST.

CHADBORN & COLDWELL MFG. CO.,

NEWBURGH, N. Y.

QUANTITY OF SEED REQUIRED

TO PRODUCE A GIVEN NUMBER OF PLANTS AND SOW A GIVEN AMOUNT OF GROUND.

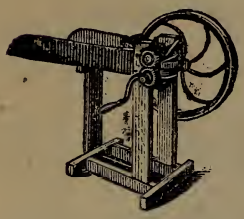
	Quantity per acre.
Artichoke, 1 oz. to 500 plants	½ lb.
Asparagus, 1 oz. to 200 plants	5 lbs.
Barley	2½ bu.
Beans, dwarf, 1 quart to 150 feet of drill	1¼ "
Beans, pole, 1 quart to 200 hills	½ "
Beet, garden, 1 oz. to 100 feet of drill	10 lbs.
Beet, Mangel, 1 oz. to 150 feet of drill	6 "
Brocoli, 1 oz. to 3,000 plants	5 oz.
Broom Corn	10 lbs.
Brussels Sprouts, 1 oz. to 3,000 plants	5 "
Buckwheat	½ bu.
Cabbage, 1 oz. to 3,000 plants	5 oz.
Carrot, 1 oz. to 250 feet of drill	2½ lbs.
Cauliflower, 1 oz. to 3,000 plants	5 oz.
Celery, 1 oz. to 10,000 plants	4 "
Clover, Alsike and White Dutch	6 lbs.
" Lucerne, Large Red and Crimson Trefoil	8 "
" Medium	10 "
Collards, 1 oz. to 2,500 plants	6 oz.
Corn, sweet, 1 quart to 500 hills	8 qts.
Cress, 1 oz. to 150 feet of drill	8 lbs.
Cucumber, 1 oz. to 80 hills	1¼ "
Egg Plant, 1 oz. to 2,000 plants	8 oz.
Endive, 1 oz. to 300 feet of drill	3 lbs.
Flax, broad cast	½ bu.
Garlic, bulbs, 1 lb. to 10 feet of Drill	
Gourd, 1 oz. to 25 hills	2½ "
Grass, Blue Kentucky	2 bu.
" Blue English	1 "
" Hungarian and Millet	½ "
" Mixed Lawn	3 "
" Orchard, Perennial Rye, Red Top, Fowl Meadow and Wood Meadow	2 "

	Quantity per acre.
Hemp	½ bu.
Kale, 1 oz. to 3,000 plants	4 oz.
Kohl Rabi, 1 oz. to 200 feet of	1½ lbs.
Leek, 1 oz. to 250 feet of drill	4 "
Lettuce, 1 oz. to 250 feet of drill	3 "
Martynia, 1 oz. to 50 feet of drill	10 "
Melon, Musk, 1 oz. to 100 hills	1¾ "
Melon, Water, 1 oz. to 25 hills	1½ "
Nasturtium, 1 oz. to 50 feet of drill	10 "
Oats	2½ bu.
Okra, 1 oz. to 50 feet of drill	10 lbs.
Onion Seed, 1 oz. to 200 feet of drill	5 "
" " for Sets	80 "
Onion Sets, 1 quart to 20 feet of drill	8 bu.
Parsnip, 1 oz. to 250 feet of drill	5 lbs.
Parsley, 1 oz. to 250 feet of drill	8 "
Peas, garden, 1 quart to 150 feet of drill	1½ bu.
" field	2½ "
Pepper, 1 oz. to 1,500 plants	4 oz.
Potatoes	8 bu.
Pumpkin, 1 quart to 300 hills	4 qts.
Radish, 1 oz. to 150 feet of drill	8 lbs.
Rye	1½ bu.
Salsify, 1 oz. to 60 feet of drill	8 lbs.
Spinage, 1 oz. to 150 feet of drill	10 "
Summer Savory, 1 oz. to 500 feet of drill	2 "
Squash, summer, 1 oz. to 40 hills	2 "
" winter, 1 oz. to 10 hills	3 "
Tomato, 1 oz. to 3,000 plants	3 oz.
Tobacco, 1 oz. to 5,000 plants	2 "
Turnip, 1 oz. to 250 feet of drill	1½ lbs.
Vetches	2 bu.
Wheat	1 to 2 "

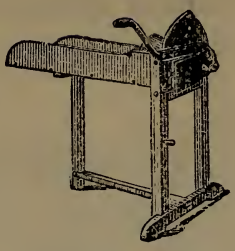
Velocity and Force of the Wind.

Description.	Miles per Hour.	Feet per minute.	Feet per second,	Force in lbs. per sq. foot.
Hardly perceptible	1	88	1.47	.005
Just perceptible	2	176	2.93	.020
	3	264	4.4	.044
Gentle Breeze	4	352	5.87	.079
	5	440	7.33	.123
Pleasant Breeze	10	880	14.67	.492
	25	1320	22	1.107
Brisk Gale	20	1760	29.3	1.968
	25	2200	36.6	3.075
High Wind	30	2640	44.	4.428
	35	3080	51.3	6.027
Very high Wind	40	3520	58.6	7.872
	45	3960	66.	9.963
Storm	50	4400	73.3	12.300
	60	5280	88.	17.712
Great Storm	70	6160	102.7	24.108
	80	7040	117.3	31.488
Hurricane	100	8800	146 6	49.200

Headquarters for Agricultural Implements.



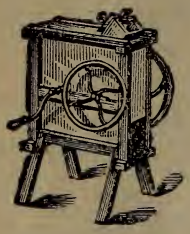
Copper Strip Feed Cutters.



Lever Feed Cutters.

Family Cider Mill.

Union Cider Mill.



Clinton Sheller,

Burrall Sheller.

Wagon Jack.

Store Trucks.

Champion Barrows.

Canal Barrows.

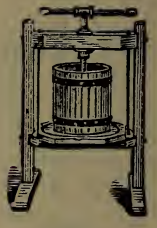
Garden Barrows.

Feed Box.

Hay Rack.

Corn Mill.

Cultivators.



Presses.

Apex Harrow

Lawn Rollers.

Road Scrapers.

Press Screw

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METROPOLITAN AGRICULTURAL WORKS,

H. B. GRIFFING, *70 Cortlandt St., NEW YORK.*

Common Names of Chemical Substances.

Common Names.	Chemical Names.
Aqua Fortis	Nitric Acid.
Aqua Regia	Nitro-Muriatic Acid.
Blue Vitriol	Sulphate of Copper.
Cream of Tartar	Bitartrate Potassium.
Calomel	Chloride of Mercury.
Chalk	Carbonate Calcium.
Salt of Tartar	Carbonate of Potassa.
Caustic Potassa	Hydrate Potassium.
Chloroform	Chloride of Gormyle.
Common Salt	Chloride of Sodium.
Copperas, or Green Vitriol	Sulphate of Iron.
Corrosive Sublimate	Bi-Chloride of Mercury.
Diamond	Pure Carbon.
Dry Alum	Sulphate Alluminum and Potassium.
Epsom Salts	Sulphate of Magnesia.
Ethiops Mineral	Black Sulphide of Mercury.
Fire Damp	Light Carburetted Hydrogen.
Galena	Sulphide of Lead.
Glauber's Salt	Sulphate of Sodium.
Glucose	Grape Sugar.
Goulard Water	Basic Acetate of Lead.
Iron Pyrites	Bi-Sulphide of Iron.
Jeweler's Putty	Oxide of Tin.
King's Yellow	Sulphide of Arsenic.
Laughing Gas	Protoxide of Nitrogen.
Lime	Oxide of Calcium.
Lunar Caustic	Nitrate of Silver.
Mosaic Gold	Bi-Sulphide of Tin.
Muriate of Lime	Chloride of Calcium.
Nitre of Saltpetre	Nitrate of Potash.
Oil of Vitriol	Sulphuric Acid.
Potash	Oxide of Potassium.
Realgar	Sulphide of Arsenic.
Red Lead	Oxide of Lead.
Rust of Iron	Oxide of Iron.
Salmoniac	Muriate of Ammonia.
Slacked Lime	Hydrate Calcium.
Soda	Oxide of Sodium.
Spirits of Hartshorn	Ammonia.
Spirit of Salt	Hydro-Chloric or Muriatic Acid.
Stucco, or Plaster of Paris	Sulphate of Lime.
Sugar of Lead	Acetate of Lead.
Verdigris	Basic Acetate of Copper.
Vermillion	Sulphide of Mercury.
Vinegar	Acetic Acid (Diluted).
Volatile Alkali	Ammonia.
Water	Oxide of Hydrogen
White Precipitate	Ammoniated Mercury.
White Vitriol	Sulphate of Zinc.

To Obtain the Weight of Grindstones.

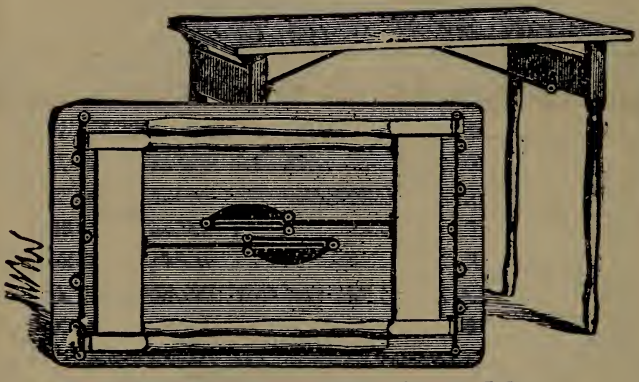
Rule: Square the diameter (in inches), multiply by thickness (in inches), then multiply by decimal .06363.

Example: Find the weight of a stone 4 feet 6 inches diameter and 7 inches thick.

4 ft. 6 in.=54 inch; square of 54=2916; multiplied by 7=20412; multiplied by .06363=Ans., 1298.815 lbs., which is weight of stone. All Grindstones weighing *less* than 200 lbs. are sold at "cut-weight." This is the actual weight over the scales as they come from the lathe (less a fair amount for moisture), and is cut into each stone. All Grindstones weighing *over* 200 pounds are sold by measurement-weight only, rule for which is given.

Udell's
Excelsior Ladder.

Pole Ladder.



New Folding Work Table.

WM. A. STOKES & CO.,

UDELL WOODEN WARE WORKS,

79 Reade Street, New York, U. S. A.

MANUFACTURERS OF

LADDERS

AND

HOUSE - FURNISHING WOODEN WARE.

Send for Descriptive Catalogue.

Rails, Splices and Bolts Required for One Mile of Track.

Tons of Rails.

Rule—To find the number of tons (of 2,240 lbs.) of Rail to the mile, divide the weight per yard by 7, and multiply it by 11, thus: for 56 lb. rail divide 56 by 7, equal 8, multiplied by 11, equal 88 tons, for one mile of single track.

Weight of Rail, per yard.	Tons per Mile.	Weight of Rail, per yard.	Tons per Mile.
12 pounds.	12 tons 920 pounds.	45 pounds.	70 tons 1600 p'nds.
14 "	22 "	48 "	75 " 960 "
16 "	25 " 320 "	50 "	78 " 1280 "
18 "	28 " 640 "	52 "	81 " 1600 "
20 "	31 " 960 "	56 "	88 "
22 "	34 " 1280 "	57 "	89 " 1280 "
25 "	39 " 640 "	60 "	94 " 640 "
26 "	40 " 1920 "	62 "	37 " 960 "
27 "	42 " 960 "	64 "	100 " 1280 "
28 "	44 "	65 "	102 " 320 "
30 "	47 " 320 "	68 "	106 " 1920 "
33 "	51 " 1920 "	70 "	110 "
35 "	55 "	72 "	113 " 320 "
40 "	62 " 1920 "	76 "	119 " 960 "

Number of Rails, Chairs, Joints, Splices and Bolts.

Length of Rail.	No. of Rails, Chairs or Joints.	No. of Splices.	No. of Bolts.
18	584	1,168	2,336
20	528	1,056	2,112
21	503	1,006	2,012
22	480	960	1,920
24	440	880	1,760
25	422	844	1,688
26	406	812	1,624
27	391	782	1,564
28	377	754	1,508
30	352	704	1,408

No allowance made for side track in above tables.

Number of Cross Ties for each Mile of Track.

Centre to Centre.	No. of Ties.	Centre to Centre.	No. of Ties
1½ feet.....	3,520	2½ feet.....	2,113
1¾ "	3,017	2¾ "	1,921
2 "	2,640	3 "	1,761
2¼ "	2,348		

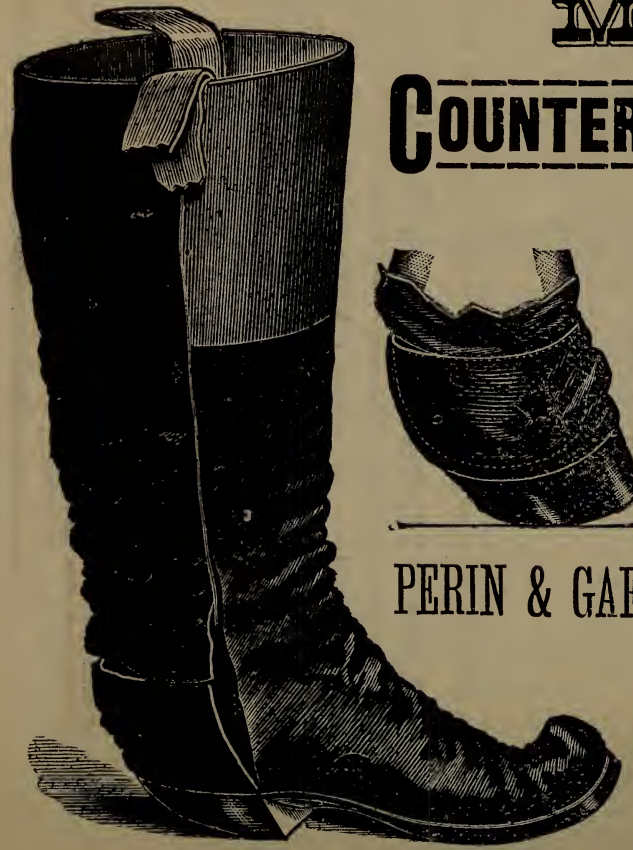
Capacity of a Freight Car.

A load is nominally 10 tons of 20,000 lbs. The following can be carried: Whiskey, 60 bbls.; salt, 70 bbls.; lime, 70 bbls.; flour, 90 bbls.; eggs, 130 to 160 bbls.; flour 200 sacks; wood, 6 cords; cattle, 18 to 20 head; hogs, 50 to 60; sheep, 80 to 100; lumber, 6,000 feet; barley, 300 bushels; wheat, 340 bushels; flax seed, 360 bushels; apples, 370 bushels; corn, 400 bushels; potatoes, 430 bushels; oats, 680 bushels; bran, 1,000 bushels; butter, 20,000 lbs.

PERFECTION AT LAST.

MORTON'S

COUNTER AND HEEL STIFFENERS



THE ONLY

Perfect

Heel Brace.

PERIN & GAFF MANUFACTURING COMPANY,

Jeffersonville, Ind.,

SOLE MANUFACTURERS.

For Sale by the Trade.

WRITE FOR PRICES.

SOME THINGS THAT ARE MISNAMED.

The misapplication of a name in speaking of the common things of life is a source of many errors, especially in the young. The reason why things are not rightly named in all cases is not because of any deficiency of our language, but because the names of most common substances were given long years ago, and very often before the true nature of the articles were understood. The "Journal of Applied Science" has this to say upon the subject:

Why should trade not have a Johnson to classify and correct the mass of inconsistencies that go to make up its nomenclature? We not only tax our brains to invent "fantastic" names for every new fabric, varied, perhaps, only by a thread or a shade from what our grandparents wore a century ago, but there are in use positive misnomers for many staple articles of merchandise. The following imperfect list, culled from sources already at hand, will give a faint idea of them:

Acid (sour), applied in chemistry to a class of bodies to which sourness is only accidental, and by no means a universal characteristic Thus rock crystals, quartz, flint, etc., are chemical acids, though no particle of acidity belongs to them.

Black lead does not contain a single particle of lead, being composed of carbon and iron.

Brazilian grass does not come from Brazil, or even grow there; nor is it grass at all. It consists of a palm leaf (Thrinax argentea), and is imported chiefly from Cuba.

Burgundy pitch is not pitch, nor is it manufactured in or exported from Burgundy. The best is a resinous substance prepared from common frankincense, and brought from Hamburg; but by far the greater quantity is a mixture of rosin and palm oil.

China, as a name for porcelain, gives rise to the contradictory expressions—British china, Dutch china, Chelsea china, etc., like wooden milestones, iron milestones, brass shoe-horns, iron pens, steel pens.

Cuttle bone is not bone at all, but a structure of pure chalk, once embedded loosely in the substance of certain species of cuttle fish. It is enclosed in a membraneous sac within the body of the fish, and drops out when the sac is opened, but it has no connection whatever with the sac of the cuttle fish.

Galvanized iron is not galvanized. It is simply iron coated with zinc; and this is done by dipping it in a zinc bath containing muriatic acid.

German silver is not silver at all, nor was the metallic alloy called by that name invented by a German, but has been in use in China time out of mind.

Honey soap contains no honey, nor is honey in any way employed in its manufacture. It is a mixture of palm oil, soap and olive-oil soap, each one part, with three parts of curd soap, or yellow soap scented.

Japan lacquer contains no lac at all, but is made from the sap of a tree called Rhus vernicifera.

Kid gloves are not usually made from kid skins, but of lamb or sheep skins. At present many of them are made of rat skins.

Meerschaum is not petrified "sea foam," as its name implies, but is a composition of silica, magnesia and water.

Mosaic gold has no connection with Moses or the metal gold. It is an alloy of copper and zinc, used in the ancient museum or tessellated work.

Mother-of-pearl is the inner layer of several sorts of shells. It is not the mother of pearl, as its name indicates, but in some cases the matrix of the pearl.

Pen means a feather (Latin penna, a wing). A steel pen is not a very choice expression.

Prussia blue does not come from Prussia, but is the precipitate of the salt of protoxide of iron with prussiate of potassa.

Salad oil is not oil for salad, but oil for cleaning sallades—i. e., helmets.

Salt is not salt at all, and has long been excluded from the class of bodies denominated "salts."

Sealing wax is not wax at all, nor does it contain a single particle of wax. It is made of shellac, Venice turpentine and cinnibar. Cinnibar gives it a deep, red color, and the turpentine renders the shellac soft and less brittle.

Sperm oil properly means "seed oil" (Latin, sperma, seed), from the notion that it was spermaceti (the sperm or melt of a whale). The sperm whale is the whale that gives "seed oil," which is taken chiefly, but not wholly from the head.

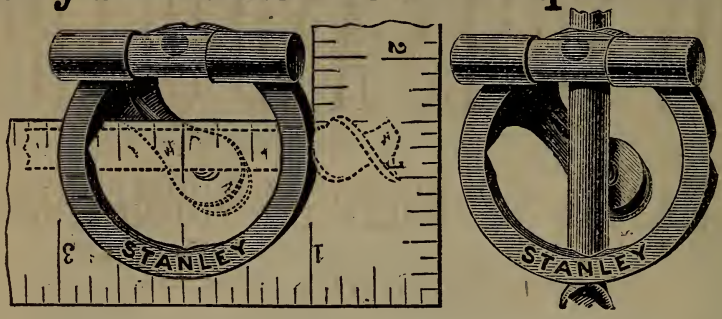
Whalebone is not bone at all, nor does it possess any of the properties of bone. It is a substance attached to the upper jaw of the whale, and serves to strain the water which the creature takes up in large mouthfuls.

Rhinoceros horn is not horn at all, but a kind of matted or compact hair, and is only like a horn from being a protuberance on the animal's head.

IMPROVED LABOR-SAVING

CARPENTERS' TOOLS.

Stanley's Patent Bit and Square Level.

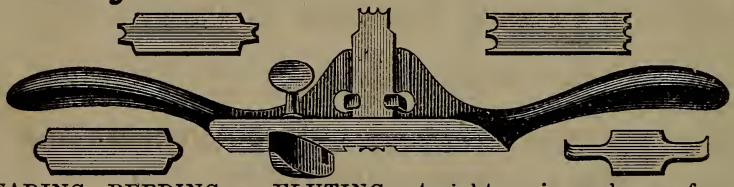


The frame of this Level has three pairs of V slots on its back edges A thumb-screw secures the Level to the Bit; and boring can be done with perfect accuracy as to perpendicular, horizontal, or angle of forty-five degrees, by observing the bubble-glass while turning the Bit.

The frame can also be attached to a Carpenter's Square. Two shoulders rest on the top of the horizontal leg to the square, thus making it an accurate Spirit-Level; and the upright leg of the square will then indicate an exact Plumb-Line.

No. 44. BIT AND SQUARE LEVEL, BRASS FRAME..... $0 30

Stanley's Universal Hand Beader.

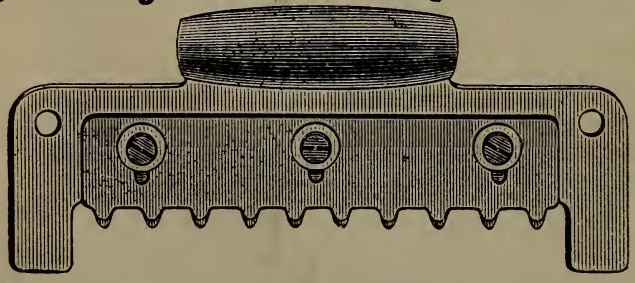


For BEADING, REEDING or FLUTING, straight or irregular surfaces, and for all kinds of LIGHT ROUTERING, this tool is invaluable to woodworkers.

Seven superior Steel Cutters go with each tool. Both ends are sharpened, thus embracing six ordinary sizes of Beads, four sets of Reeds, two Fluters, and a double Router Iron (⅛ and ¼-inch.)

No. 66. IRON STOCK, WITH SEVEN STEEL CUTTERS.....$1 00

Stanley's Adjustable Clapboard Marker.



The sharp edges of the teeth on the marking blade are just parallel with the outer surfaces of the legs when placed against the corner-board or window-casing; and by moving the tool half an inch it will mark a full line across the clapboard, exactly over and conformed to the edge of the corner-board or casing. There is then no difficulty in sawing for a perfectly close joint.

No. 88. IRON STOCK, WITH WOOD HANDLE, STEEL BLADE $0 50

MANUFACTURED BY THE

STANLEY RULE AND LEVEL CO.,

NEW BRITAIN, CONN.

WAREROOMS, - - - - 29 CHAMBERS STREET, NEW YORK.